SOUTHWEST ALASKA
TRANSPORTATION PLAN

DESCRIPTION OF ALTERNATIVES

TECHNICAL MEMORANDUM

prepared for the

Alaska Department of Transportation and Public Facilities

prepared by

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INTRODUCTION

This document is an executive summary of the initial transportation alternatives developed in the course of the Southwest Alaska Transportation Plan. The purpose of this document is to describe the elements of the alternatives and the alternatives' benefits as integrated system components. Evaluation of the alternatives will occur in a subsequent step and will be documented separately. In any case, whereas initial technical analyses supporting the projects proposed herein focused on developing specific projects to link communities and activity areas, this document takes the next step – that of packaging individual projects together with others in their vicinity or along strategic corridors. This step brings us closer to the objective of developing a system plan with a truly regional orientation.

While projects will be evaluated as elements in synergistic packages, it is important to bear in mind that financial constraints, in terms of both maintenance and operations (M&O) and capital costs, make it extremely unlikely that it would be feasible to implement packages with multiple elements at once, or even within the 20-year horizon of this planning effort. The Legislature's appropriation of funding to DOT&PF over the past several decades has held M&O spending to a constant level, which, given inflation, means that the real amount available to operate and maintain critical services has actually declined. The state's substantial budget shortfall means that scrutiny is particularly strong this year. Many of the projects proposed herein would increase M&O costs. They would also require substantial capital outlays.

Discussed in this Executive Summary are only summary statistics and analyses for each project and package. The technical analyses that went into developing these projects and packages reflect a significant research effort encompassing environmental, marine, and civil engineering; financial analyses; and demand estimation modeling. As such, full documentation of these analyses are provided in separate technical appendices.

Appendix A contains technical documentation on the marine alternatives, including capital and M&O costs, operating issues, demand and revenue estimates, and model schedules for each proposed marine alternative (as well as documentation for the handful of marine alternatives that were considered but then withdrawn from further evaluation). Appendix B contains documentation pertaining to the proposed roadway links set forth, including topographical, environmental, and construction issues; development of a methodology with which to estimate capital and M&O costs; demand estimates, and design standards. Appendices C through G contain documentation pertaining to an assortment of areas, including aviation issues and the travel demand estimation methodologies.

In addition to setting forth the seven transportation alternatives developed for consideration in this planning effort, this document also describes the process by which these projects were identified, conceived, assembled, analyzed, and refined. This complex, time-consuming process takes into account the input of many individuals and agencies, including the Southwest Alaska Transportation Plan Advisory Committee; multiple departments of DOT&PF; and the consultant team, led by Parsons Brinckerhoff, and including HDR Alaska, Northern Economics, the Glosten Associates, and Ogden Beeman Associates.

Listed in Table 1 are the seven transportation alternatives developed in the course of this planning effort, including each alternative's constituent elements.

Table 1
Transportation Alternative Packages for Evaluation
Southwest Alaska Transportation Plan

Package	Elements
1. Baseline Alternative	All regional transportation projects programmed for the Southwest Alaska Study Area, as reflected in STIP, Aviation Improvement Program, and Legislative Funding for FY 1999 for Ports and Harbors
2. Bristol Bay to Cook Inlet Corridor Alternative	1. Homer to Williamsport Marine Service 2. Williamsport to Pile Bay Roadway Link OVERLAND OPTION A. VIA KING SALMON Elements 1-2, plus • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway Link • Igiugig to King Salmon Roadway Link OVERLAND OPTION B. VIA NAKNEK Elements 1-3, plus • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway Link • Igiugig to Naknek Roadway Link • Igiugig to Levelock Roadway Link MARINE OPTION A. VIA HOVERCRAFT Elements 1-2, plus • Lake Iliamna–Kvichak River Service via Hovercraft MARINE OPTION B. VIA SHALLOW-DRAFT LANDING CRAFT Elements 1-2, plus • Lake Iliamna–Kvichak River Service via Shallow-Draft Landing Vessel
3. Dedicated *Tustumena*	Redeployment of Tustumena such that vessel service is dedicated to Southwest Alaska Study Area
4. Alaska Peninsula Roadway System (Northern Portion)	• South Naknek to Naknek Roadway Link • King Salmon to Egegik Roadway Link • Egegik to Pilot Point Roadway Link • Pilot Point to Ugashik Roadway Link • Pilot Point to Port Heiden Roadway Link
5. Alaska Peninsula Roadway System (Southern Portion)	• Port Heiden to Chigniks Roadway Link • Chignik Lake to Chignik Bay to Chignik Lagoon Roadway Link • Metrofania Airport
6. Bristol Bay Marine Service	• Marine system serving Togiak, Dillingham, Clarks Point, Naknek, and Egegik
7. Intra Kodiak Island Marine Service	• Marine service serving the outports of Kodiak Island

In addition to the transportation alternatives just listed, this document discusses several transportation issues of regional significance in Southwest Alaska. They are mentioned briefly here, and discussed more fully later in this document:

1. **Akutan to Unalaska Transportation Link**. An airport master plan is currently underway in Akutan, which currently has only a seaplane facility. The issue here is that the aircraft used to serve Akutan, the Grumman Goose, will no longer be manufactured, and other types of amphibious craft may not be suitable for the existing seaplane facility. The airport master plan now underway is exploring the feasibility of developing a land-based airport in Akutan. However, the area's severe topographic constraints may preclude development of a such a facility. In the event that the plan reveals that building a land airport in Akutan will not be feasible, a marine alternative to connect Akutan with the regional services and transportation facilities should be explored. The first steps toward analysis of a marine link between Akutan and Unalaska were undertaken in this planning effort, and they are summarized herein.

2. **Exploration of Development of Terminal Facilities in Southwest Alaska**. The lack of terminal facilities in many Southwest Alaska airports has been cited as an obstacle to attracting tourism, which could help diversify and strengthen the region's economic base. In addition, some have questioned the lower level of comfort and service in air travel in Southwest Alaska as opposed to other parts of the country and state. To address these concerns, possibilities for developing terminal facilities, which would involve local sponsorship, are explored.

3. **Exploration of Development of an Aviation Hub in Southwest Alaska**. A commonly noted transportation issue in Southwest Alaska is the lack of an effective aviation hub in the region, necessitating long and expensive trips to Anchorage to travel even between communities within the region. As such, undertaken as part of this transportation planning effort was an exploration of what would be required to induce air carriers to shift their operations to support development of an aviation hub within Southwest Alaska, in a location such as King Salmon, Kodiak, Cold Bay, or Dillingham. Although this exploration ultimately revealed that developing such a hub would require expensive subsidies, the cost of which would almost certainly be prohibitive, the findings of this study are nonetheless helpful in understanding the region's economic and transportation challenges.

4. **Recent Transportation Developments in Linking King Cove and Cold Bay**. The effort to provide a safer, more reliable link between the communities of King Cove and Cold Bay, which are separated by Cold Bay and the Izembek National Wildlife Refuge, has long been a goal of local governments. Accordingly, marine and roadway projects to accomplish this goal were explored as part of this planning effort. As these analyses were being conducted, Congress moved to provide resources with which to provide such a linkage. These developments are summarized herein.

PROCESS

Discussed in this section of the report is the process via which the alternatives proposed in the Southwest Alaska Transportation Plan have been identified, developed, packaged, and refined.

The first step in developing transportation alternatives for the Southwest Alaska Transportation Plan occurred at a June 1998 meeting of the Southwest Alaska Transportation Plan Advisory Committee, where key deficiencies in terms of both overland and marine links at the regional level were identified. These deficiencies took the form of missing or underserved links between and among the region's communities. In addition to the links offered by the Advisory Committee, the consultant team identified a few other linkages, that if completed in addition to the set of critical links, would constitute a complete, coherent regional transportation network. The meeting identified missing or underserved marine links and overland links, which are summarized in Table 2. Deficiencies in aviation options were also noted, although at a somewhat broader level. For the purposes of intermodal connectivity and systems integration, the meeting also identified the region's natural transportation hubs (Table 3).

Table 2
Critical Missing or Underserved Marine and Roadway Links

Critical Missing or Underserved Marine Links	Critical Missing or Underserved Roadway Links
Homer–Williamsport–Kodiak	Williamsport–Pile Bay
Iliamna Lake	Iliamna–Pedro Bay–Pile Bay
Kvichak River	Newhalen–Iliamna–Nondalton
Togiak–Clarks Point–Dillingham–Naknek–Egegik (Bristol Bay)	Dillingham–Aleknagik
Intra-Kodiak Island Borough	South Naknek–Naknek–King Salmon
King Cove–Cold Bay	Ivanof Bay–Perryville
King Cove–Cold Bay–False Pass	Perryville–Chigniks
St. Paul–St. George	Chignik Bay–Chignik Lagoon–Chignik Lake
Unalaska–Pribilofs–Dillingham	Chigniks–Port Heiden
Unalaska–Akutan	Port Heiden–Pilot Point
	Pilot Point–Ugashik
	King Cove–Cold Bay

Table 3
Southwest Alaska's Subregional "Hubs"

Dillingham	St. Paul
Iliamna	Unalaska
King Salmon/Naknek	King Cove/Cold Bay*
Kodiak	

*The communities of King Cove and Cold Bay could only function as a joint regional hub if a road or ferry connection between the two were developed.

The next step in the alternatives development process involved researching and specifying service concepts with which to address the identified transportation deficiencies. Taking the list of critical missing or underserved marine and roadway links as its starting point, the consultant team researched what would be required in terms of new infrastructure and/or service to address the implied needs.

In some cases, service concepts addressing specific links had already been conceived, studied, and prioritized – most notably several of the roadway concepts. In other cases, however, including all of the marine service concepts, and many of the roadway concepts, the proposed infrastructure or services are new. As such, developing these service concepts from the ground up required extensive research. Among the issues that had to be explored were the estimation of capital and operating costs, model schedules, and identification of environmental constraints. Table 4 contains a list of the concepts designed to address these missing or underserved links. The concepts designed to serve these missing or underserved critical links were presented at a September 1998 Advisory Committee meeting at SWAMC in King Salmon. Based on comments received at this meeting, more frequent AMHS service to Sand Point was added.

Once the consultant team had fleshed out the isolated service concepts, the effort to integrate the concepts into an interconnected system of discrete transportation alternatives began to take shape. A milestone at this point in the process was the March 1, 1999, Strategy Session in Anchorage, attended by the project team, including consultants and DOT&PF staff. [1] During this all-day session, the consultants and DOT&PF staff made strategic decisions, based on preliminary analyses, as to which concepts to further develop, and in what fashion.

Consequently, the consultant team moved the alternatives development process forward by developing several new alternatives; reconfiguring, revising, and refining several existing concepts into more detailed alternatives; and dropping from further consideration two marine concepts whose likely benefits would be far outweighed by their high costs. The two concepts withdrawn at this point were: (1) marine service between St. Paul and St. George; and (2) marine service among Unalaska, the Pribilofs, and Dillingham. The results of this step in the process are summarized in Table 5, Table 6, and Table 7.

[1] The consultants represented at this meeting were Parsons Brinckerhoff, HDR, Northern Economics, and The Glosten Associates. DOT&PF staff in attendance were Jeff Ottesen, Eric Taylor, Jennifer Wilson, Murph O'Brien, Roger Maggard, and Mark Mayo.

Table 4
Marine and Roadway Concepts Developed to Address Critical Missing or Underserved Transportation Links

CONCEPTS DEVELOPED TO ADDRESS MISSING OR UNDERSERVED MARINE LINKS	▪ Homer–Williamsport–Kodiak Marine Link ▪ Iliamna Lake–Kvichak River Marine Link ▪ Bristol Bay Marine Link ▪ Intra-Kodiak Island Borough Marine Link ▪ King Cove–Cold Bay Marine Link ▪ King Cove–Cold Bay–False Pass Marine Link ▪ St. Paul–St. George Marine Link ▪ Unalaska–Pribilofs-Dillingham Marine Link ▪ Unalaska–Akutan Marine Link
CONCEPTS DEVELOPED TO ADDRESS MISSING OR UNDERSERVED OVERLAND LINKS	▪ Williamsport–Pile Bay Roadway Link ▪ Iliamna–Pedro Bay–Pile Bay Roadway Link ▪ Newhalen–Iliamna–Nondalton Roadway Link ▪ Dillingham–Aleknagik Roadway Link ▪ South Naknek–Naknek Roadway Link ▪ Ivanof Bay–Perryville Roadway Link ▪ Perryville–Chigniks Roadway Link ▪ Chignik Bay–Chignik Lagoon–Chignik Lake Roadway Link ▪ Chigniks–Port Heiden Roadway Link ▪ Port Heiden–Pilot Point Roadway Link ▪ Pilot Point–Ugashik Roadway Link* ▪ King Cove–Cold Bay Roadway Link ▪ Egegik–King Salmon Roadway Link*
CONCEPTS DEVELOPED TO IMPROVE AVIATION SERVICE	▪ Development of a Southwest Alaska Aviation Hub ▪ Establishment of criteria for use in determining how to best focus airport development resources

Table 5
Revisions to the Initial List of Marine Transportation Alternatives for the Southwest Alaska Transportation Plan

Alternative	Action	Notes
Dedicated *Tustumena* in Southwest Alaska	Develop a new alternative, wherein the *Tustumena* is dedicated to service in SW Alaska.	To provide a more interconnected regional system, and to provide isolated communities another modal option.
Homer–Williamsport–Kodiak Marine Link	Revise existing concept; in particular, drop Kodiak from proposed circuit; reconfigure as Homer – Williamsport with complementary service between Homer and Seldovia.	Dedicated *Tustumena* or Intra-Kodiak Island Borough Marine Link would provide service to Kodiak. Seldovia would lose service with the dedicated *Tustumena*, so this marine link would replace that service.
Iliamna Lake–Kvichak River Marine Link	Revise existing concept; in particular, evaluate feasibility of hovercraft service. Revisit appropriateness of shallow-draft landing craft in light of possible tourist growth.	The hovercraft offers the possibility of extended season service as hovercraft could operate over shoal waters in the Kvichak River and over ice, which the shallow-draft landing vessel initially researched could not accomplish.
Bristol Bay Marine Link	Retain	Limited operability is an issue: service would only be feasible from May to October. Shallow water at ports served further limits operability because of tide-related delays.
Intra-Kodiak Island Borough Marine Link	Retain	Candidate for local ownership, operation, and maintenance. Otherwise incremental M&O costs are not supportable.
King Cove–Cold Bay Marine Link	Addressed via Congress	Federal appropriation will facilitate individual solution to serve this link.
King Cove–Cold Bay–False Pass Marine Link	Drop as a separate service concept	False Pass would receive a higher level of service under the dedicated *Tustumena* alternative
St. Paul–St. George Marine Link	Withdraw this concept	Very low benefits relative to costs. Marginal regional benefit given the remoteness of ports served.
Unalaska–Pribilofs–Dillingham Marine Link	Withdraw this concept	Even preliminary analyses indicate that this alternative would have a very low benefit-cost ratio. In addition, long distances between ports in rough waters would make for uncomfortable passenger voyages, limiting ridership
Unalaska–Akutan Marine Link	Develop a new service concept in light of current master planning efforts for a new airport in Akutan.	This alternative would provide an essential transportation link between these communities in the event that service by amphibious aircraft is no longer feasible, due to mechanical obsolescence and that a land-based airport cannot be built in Akutan.

Table 6
Revisions to the Initial List of Roadway Transportation Alternatives for the Southwest Alaska Transportation Plan

Alternative	Action	Reason
Williamsport–Pile Bay Roadway Link	Retain this concept and revisit the service demand estimate for this alternative in light of freight movement needs.	Travel between Cook Inlet and Bristol Bay using the Williamsport–Pile Bay Road is safer and faster than sailing around the Alaska Peninsula.
Iliamna–Pedro Bay–Pile Bay Roadway Link	Revisit service demand estimate in light of freight movement needs.	The road would provide Pile Bay and Pedro Bay access to the airport at Iliamna and would allow for tourist access to Lake Clark National Park.
Newhalen–Iliamna–Nondalton Roadway Link	Treat this concept as a funding decision that has already been made and programmed.	Iliamna to Nondalton Road completion has already been programmed in the STIP.
Dillingham–Aleknagik Roadway Link	Treat this concept as a funding decision that has already been made and programmed.	Lacking bridge across the Wood River, access depends on an ice road crossing, or passenger and freight shuttle across the river by skiff. Already programmed in STIP.
South Naknek–Naknek-Roadway Link	Retain this concept making sure that the demand estimate accounts for the movement of schoolchildren; consider freight movement of fish	This alternative could support consolidation of airports, thereby reducing state-supported M&O costs.
Ivanof Bay–Perryville Roadway Link	Retain	Treat as element of Alaska Peninsula Roadway Alternative
Perryville–Chigniks Roadway Link	Retain	Treat as element of Alaska Peninsula Roadway Alternative
Chigniks Roadway Link	Revisit this alternative in light of possible airport consolidation.	This roadway alternative could be integrated with a new regional airport at Metrofania, raising the possibility of consolidating smaller airports in the immediate area
Chigniks–Port Heiden Roadway Link	Retain	Treat as an element of Alaska Peninsula Roadway Alternative.
Port Heiden–Pilot Point Roadway Link	Retain	Treat as element of Alaska Peninsula Roadway Alternative
Pilot Point–Ugashik Roadway Link	Retain	Treat as element of Alaska Peninsula Roadway Alternative
King Cove–Cold Bay Roadway Link	Withdraw this alternative.	A federal appropriation will facilitate individual resolution of this issue.
Egegik–King Salmon Roadway Link	Retain	Treat as element of Alaska Peninsula Roadway Alternative

Table 7
Revisions to the Initial List of Aviation Transportation Alternatives for the Southwest Alaska Transportation Plan

Alternative	Action	Reason
Unalaska–Akutan Aviation Link	Explore the aviation connection between these communities.	The imminent obsolescence of the aircraft now providing this aviation link may make it necessary to consider other ways of linking these communities.
Encourage development of a true regional aviation “sub-hub” in Southwest Alaska	Withdraw this concept.	Initial analysis revealed that is not economically feasible, insofar as sizable DOT&PF subsidies to private carriers would be required.
Development of more sophisticated terminal facilities at Southwest Alaska airports	Further develop this concept by compiling an inventory of current airport terminal facilities	The lack of terminals in many Southwest Alaska airports may limit economic development, and results in low levels of comfort for traveling residents and their visitors

Members of the consultant team again met with DOT&PF staff on July 12, 1999, to discuss initial packaging of the list of service and facility concepts. The packages represent regional subsystems that, if built, would substantially improve access and mobility within the region, as well as facilitating movement to and from the region from areas outside it. Projects were combined based on their ability to, improve both passenger and freight movement, improve intermodal connections, enhance economic efficiency, and improve levels of service.

The next step in this regional transportation planning process, to be documented in a subsequent report, will be to evaluate each of the alternatives presented herein. This evaluation will be based on the process set forth in an earlier document produced as part of this plan, *Southwest Alaska Transportation Plan Evaluation Process and Criteria*. The evaluation process described in this document incorporates the goals and objectives for the Southwest Alaska Transportation Plan, as well as the criteria and scoring system used in the Statewide Transportation Improvement Program (STIP). These sources were merged and integrated to ensure that the evaluation process would reflect regional perspectives, within a framework compatible with DOT&PF's own planning process. The outcome of this evaluation process will be a set of recommended alternatives, along with short- and long-term phasing plans.

THE ALTERNATIVES

1. THE BASELINE ALTERNATIVE

The first "alternative" customarily presented in any planning effort is the Baseline Alternative. The Baseline Alternative accounts for all existing facilities and services, as well as those that have not yet been built or implemented, but that have been committed to and funded by a sponsoring agency. It therefore, describes the transportation system that would exist even if none of the other alternatives proposed in a given plan were ultimately acted upon. It is important to present the Baseline Alternative up front, since it is within this context that the other proposed alternatives would function.

To develop the Baseline Alternative for the Southwest Alaska Transportation Plan, the consultant team researched several sources: the inventory of existing conditions compiled as part of this planning effort and documented in *Southwest Alaska Transportation Plan Existing Conditions Technical Memorandum (*April 1998*),* the 1998-2000 Statewide Transportation Improvement Program, Amendment #11 (Major), DOT&PF's 1998-2000 Airport Improvement Program Spending Plan[2], and a list of Fiscal Year 1999 Legislative Funding Appropriations for Ports and Harbors.[3]

Each of these documents was culled, and a summary table of all projects slated for the Southwest Alaska study area was generated (Table 8). In culling these sources, the consultant team included only those projects of regional transportation significance. Local sanitation roads, for example, were not included. Nor were routine maintenance projects at airports, although major maintenance projects were included. Also not included in the baseline are research projects (for instance to establish navigability feasibility) or master planning efforts. All told, baseline surface transportation projects programmed in the region amount to $25.9 million; baseline aviation projects programmed amount to $40.2 million; and ports and harbors projects for which the Legislature has approved funding in the region amount to $17.6 million, for a grand total of $83.7 million. Projects comprising the Baseline Alternative for the Southwest Alaska Transportation Plan are mapped in Figure 1.

[2] Provided in spreadsheet format by Roger Maggard (February 1999)

[3] Provided by Harold Moeser (February 1999)

Table 8
Baseline Alternative – Programmed Improvements

Community	Roadways and Trails	Amt	Aviation	Amt	Ports and Harbors	Amt
Aleknagik	• Wood River Bridge	$700K				
Chignik					• Small Boat Harbor	$3.31 M
Chignik Lagoon			• Chignik Lagoon Interim Improvements	$1 M		
Chignik Lake			• Chignik Lake RYW Resurfacing and Lighting	$1.35 M		
Clarks Point			• Clarks Point Airport Relocation	$4.2 M		
Cold Bay			• Cold Bay CW RWY Resur & SA Expansion	$4 M		
Egegik			• Egegik RWY Extension & Resurfacing	$3 M		
Iliamna	• Nondalton Road Completion	$5.4 M		$1 M		
King Cove	• Lagoon Bridge/Airport Access Road	$6.15 M			• King Cove Harbor	$2.24 M
Kodiak	• Pasagshak Road Spot Reconstruction • Rezanof Drive 'Y' Intersection Improvement • Selief Lane Reconstruction	$910 K $2.35 M $450 K			• Kodiak Harbor major maintenance, repairs, and replacements	$7.77 M
Levelock			• Levelock Airport Relocation	$3 M		
Naknek		$2.6 M	• Naknek CW RWY Relocation & Apron Construction	$3.5 M		
New Stuyahok			• New Stuyahok Airport Relocation	$3.5 M		
Pedro Bay	• Bridge replacement (Pedro Creek)	$520 K				
Perryville			• Perryville Airport Improvements	$2.5 M		
Pilot Point			• Pilot Point Airport Relocation	$4.5 M		
Saint George					• Saint George Harbor	$225 K
Saint Paul					• Saint Paul Harbor	$4.04 M
Sand Point			• Sand Point RWY Rehabilitation and Extension	$4.9 M		
Unalaska	• South Channel Bridge Construction	$6.82 M	• Unalaska Airport Safety Improvements	$3.7 M		
Region	Winter Trail Markings	$200 K				

Sources: 1998-2000 Statewide Transportation Improvement Program, Amendment #11 (Major); DOT&PF's AIP Spending Plan; TY 1999 Legislative Funding Appropriations List. Note that in addition to the improvements listed in this table, the City of King Cove and the Aleutians West Borough have received a substantial Congressional earmark which will allow the communities of King Cove and Cold Bay to explore various modal alternatives to improve their linkage, which will in turn improve residents' medical care and safety through better aviation facilities.

Bethel
Kuskokwim Bay
Goodnews Bay
Platinum
Twin Hills
Togiak
Dillingham
Manokotak
Ekuk
Clarks Point
Alegnagik
Koliganek
New Stuyahok
Ekwok
Portage Creek
Levelock
Naknek
King Salmon
South Naknek
Egegik
Bristol Bay
Pilot Point
Ugashik
Port Heiden
Chignik Lagoon
Chignik
Chignik Lake
Nelson Lagoon
Port Moller
Ivanof Bay
Perryville
Cold Bay
King Cove
Sand Point
Unga
False Pass
Unalaska
Akutan
Nikolski
Saint Paul
Pribilof Islands
Saint George
Illiamna
Nondalton
Port Alsworth
Pedro Bay
Pile Bay
Williamsport
Iguigig
Kokhanok
Anchorage
Kenai
Homer
Seldovia
Port Graham
Kodiak
Ouzinkie
Port Lions
Port O Brien
Karluk
Larsen Bay
Old Harbor
Akhiok
A
A
Scale 1:3500000
0km 100km 200km
0mi 100mi
N
W E
S
Approximate scale: 1:10,000,000
Attu
Shemya Station
Aleutian Islands
Adak Station
Atka
A
A
Area of Map
tion
Existing Roads
Trail Marking Project (ADOT&PF)
Data Sources:
Alaska Department of Labor
Alaska Department of Natural Resources
Alaska Department of Transportation
Federal Aviation Administration
US Army Corps of Engineers
TRANSPORTATION & PUBLIC FACILITIES
STATE OF ALASKA
HDR Alaska
PB
100 YEARS
File: pltsw310
Date: 7/21/99
By: MAS
Southwest Alaska Transportation Plan
Initial Transportation System Alternatives
Technical Memorandum

Winter Trail Markings

One baseline improvement, DOT&PF's Winter Trail Marking Project, merits special attention. For thousands of years, Alaska Natives have relied on a system of winter trails to navigate across often, inhospitable and remote terrain. This traditional trail system provides an important land-based connection between many of the communities within the planning area. Originally traversed by dog sled or on foot, the routes are now typically traveled by snow machines or all-terrain vehicles. Often these routes provide important links to the rest of Alaska and beyond, and during times when air travel is inaccessible, provide the only means of obtaining supplies, medical attention, and other important services to remote villages.

An existing winter trail system connects the villages and communities of Goodnews Bay, Twin Hills, Togiak, Manokotak, Dillingham, Ekwok, New Stuyahok, Koliganek, Portage Creek, Levelock, and Naknek. Travel between villages is by snow machine over seasonally frozen tundra. After spring thaw, these trails are generally incapable of supporting vehicle or foot traffic.

Winter storms, which cause drifting snow and poor visibility, obscure the natural terrain features along the Bristol Bay coast that would typically used for navigation. Such conditions make navigation difficult and dangerous. These trail systems are not clearly marked. Travelers who become disoriented and lost in winter along these trails are at risk of exposure. The risk of becoming lost increases substantially without a dependable visual marking system for navigation.

DOT&PF has programmed a project to install high-visibility trail markers along each trail segment, providing a reliable navigation reference for travelers, as well as search and rescue teams. The trail markers will be installed at maximum intervals of roughly 500 feet. The distance between markers will vary with terrain, wind, and soil conditions. The foundation for each marker is a 4-foot length of reinforcing steel driven three feet into the ground. The marker will be a 5-foot length of translucent plastic tubing with reflective materials attached, fastened to the steel rod with hose clamps. The routes and distances to marked are identified in Table 9. DOT&PF has $200,000 programmed for design and construction in the year 2000 to complete the project. The Department estimates that each marker will run about $19 installed.[4]

[4] Construction and Maintenance Issues. The USF&WS raised concerns about the original design of the markers on past winter trial marking projects. They believed that the tubing collected water which froze, splitting the tubing and causing the markers to break. DOT&PF amended the design to have a cap on top to keep water out of the tubing.

Table 9
Winter Trail Marking Plan

From	To	Approx. Trail Mileage
Goodnews Bay	Togiak	45
Togiak	Twin Hills	6
Twin Hills	Manokotak	47
Manokotak	Dillingham	23
Dillingham	Ekwok	10
Ekwok	New Stuyahok	10
New Stuyahok	Koliganek	28
Dillingham	Portage Creek	35
Portage Creek	Levelock	60
Levelock	Naknek	50
TOTAL		314

2. COOK INLET TO BRISTOL BAY CORRIDOR ALTERNATIVE, OVERLAND

This alternative would provide a surface transportation link between Cook Inlet and Bristol Bay. In so doing, this alternative would improve mobility and access for many communities in the study area, including Pedro Bay, Nondalton, Iliamna, Newhalen, Igiugig, Levelock, Naknek and King Salmon – providing them for the first time a well developed surface transportation link to the Kenai Peninsula, Anchorage, and the state's primary roadway network. This alternative also has significant potential for improving the efficiency of regional freight movement and economic development.

Explored in this alternative are four separate options for traversing the roughly 250 miles between Homer and Bristol Bay (Table 10). Two of the options provide an uninterrupted set of roadway links – one via King Salmon, the other via Naknek. Meanwhile, the other two options provide a roadway connection until Iliamna, but then traverse the rest of the distance by either a shallow-draft landing vessel, or hovercraft.

Table 10
Cook Inlet to Bristol Bay Corridor Alternative
Four Options

OVERLAND OPTIONS		**COMBINATION OVERLAND/MARINE OPTION**	
Via King Salmon	Via Naknek	Via Shallow-Draft Landing Vessel	Via Hovercraft
• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway • Igiugig to King Salmon Roadway Link	• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway • Igiugig to Levelock Roadway Link • Igiugig to Naknek Roadway Link	• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Lake Iliamna–Kvichak River Service via Shallow-Draft Landing Vessel	• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Lake Iliamna–Kvichak River Service via Hovercraft

Bethel
Kuskokwim Bay
Koliganek
New Stuyahok
Aleknagik
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Manokotak
Ekwok
Dillingham
Levelock
Ekuk
Portage Creek
Clark's Point
King Salmon
Naknek
South Naknek
Egegik
Bristol Bay
Pilot Point
Ugashik
Port Heiden
Port Alsworth
Iliamna
Nondalton
Newhalen
Pile Bay
Williamsport
Pedro Bay
Kokhanok
Igiugig
Kenai
Homer
Seldovia
Port Graham
Port Lions
Port O Brien
Ouzinkie
Kodiak
Karluk
Larsen Bay
Old Harbor
Akhiok
Chignik Lagoon
Chignik
Chignik Lake
Perryville
Ivanof Bay
Nelson Lagoon
Port Moller
Cold Bay
King Cove
Sand Point
Unga
False Pass
Akutan
Unalaska
Nikolski
Saint Paul
Pribilof Islands
Saint George
Scale 1:3500000
0km 100km 200km
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Attu
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TRANSPORTATION & PUBLIC FACILITIES
STATE OF ALASKA

HDR Alaska
PB 100 YEARS

File:	Date:	By:
pltsw308	7/21/99	MAS

- Cook Inlet to Bristol Bay Corridor
- Kodiak Inter-Island Ferry
- Dedicated Tustumena Service
- Southern Peninsula Road System
- Northern Peninsula Road System
- Bristol Bay Ferry
- Winter Trail Markers
- Study Corridors
- Existing Roads
- Regional Hubs

Area of Map

Data Sources:
Alaska Department of Labor
Alaska Department of Natural Resources
Alaska Department of Transportation
Federal Aviation Administration
US Army Corps of Engineers

Southwest Alaska Transportation Plan

Initial Transportation System Alternatives Technical Memorandum

This alternative would provide several benefits to the region and to the communities along the proposed corridor, including the following:

- It would open up a shorter, less dangerous, less expensive freight route from Cook Inlet to Bristol Bay. A continuous surface route across the top of the Alaska Peninsula would mean that it would no longer be necessary to transport goods by barge all the way around the Alaska Peninsula.
- By making scenic wilderness areas, businesses, and lodges along the corridor more accessible to visitors, this alternative would support tourism in the region.
- This alternative would provide the communities of interior Southwest Alaska with greater connectivity to one another, which would promote their economic development.
- This alternative would provide communities along the corridor with a modal alternative to reaching major activity centers such as Anchorage and Kodiak by air.
- Insofar as this alternative is based in large part on the existing road from Williamsport to Pile Bay, it provides a cost-effective means of expanding the core highway system because the right-of-way for this link is already established and owned by DOT&PF.
- The project would promote the economic development of Bristol Bay fisheries. Boat repair and storage facilities are limited in Bristol Bay, requiring many boat owners to bring their boats to Homer. The overland route avoids the time-consuming and hazardous open ocean voyage around the Alaska Peninsula, thereby saving money and increasing safety. The route also saves deterioration of fishing boats not designed for extensive open ocean travel.

Baseline

A key baseline improvement programmed within the proposed corridor is completion of the Iliamna–Nondalton Road, a $9.75 million project which will complete the roadway connection between Iliamna and Nondalton by bridging the Newhalen River and constructing three final miles of roadway on the Nondalton side of the river. This baseline improvement would integrate Nondalton, a community with a 2020 base population forecast of 317 into the rest of the proposed corridor. The other baseline improvement relevant to this proposed alternative is DOT&PF's Winter Trail Marking project, which will mark 314 miles of trails – from Goodnews Bay all the way to Levelock and Naknek, communities served directly by the proposed corridor.

Element 1. Homer-Seldovia-Williamsport Marine Service

Proposed in this alternative is new marine service linking Seldovia and Homer, on the Kenai Peninsula, with Williamsport, which lies on the western shores of Cook Inlet, just off Iliamna Bay. This link would provide the first element of a surface transportation corridor linking Alaska's overland transportation system and population concentrations with the communities of the Lake and Peninsula and Bristol Bay Boroughs.

As envisioned, this marine service would not only provide a new link between Williamsport and Homer, but it would also continue to serve the linkage between Homer and Seldovia now provided by current AMHS service. In fact, as configured for planning purposes, it could provide an equal or greater level of service frequency and capacity compared to the current service provided by the *Tustumena*.

THE VESSEL

A separate alternative proposed in this document is a reconfiguration of AMHS service that would result in the dedication of the *Tustumena* to ports in the Southwest Alaska Study Area (along with connections to the Kenai Peninsula). As such, a new vessel was explored to provide the proposed service between Homer, Seldovia, and Williamsport. Given the run across lower Cook Inlet, an area noted for steep seas, strong currents, and winter ice floes, the vessel providing this service would have to be capable of navigating in high winds, seas, spray icing conditions, and sea ice.

For planning purposes, a basis vessel was chosen to illustrate this alternative. The basis vessel selected, the *M/V Nunaiq*, is a 150'-6" long, with a 47' beam, an 8' depth, a 3'-9" to 6'0" draft and a cruising speed of 9 knots. Although the basis vessel and others of this type have extensive operation experience in Alaska waters, some design enhancements, including minimum ice strengthening, expandable passenger capacity, and increased freeboard and bulwark height should be considered. The capital cost of such a vessel is estimated at $2.75 million.

SCHEDULE AND FREQUENCY OF SERVICE

Physical laws regarding the resistance of displacement vessels limit conventional monohull ferries with length on the order of 150' to speeds between 9 and 12 knots. Even at 12 knots, the 152 nautical mile trip between Homer and Williamsport would take more than 12 hours for running time alone (without allowance for port time, startup, or shutdown). Another factor in scheduling this service hinges on the shallow water and dredged channel at Williamsport, which would make it prudent to time trips to match the tide at Williamsport. As such, one round trip between Homer and Williamsport could be scheduled in any 24-hour period, but the timing of departures and arrivals would vary from day-to-day based on tides. Based on a 9-knot service speed (and allowing one half hour for morning startup and one-half hour for evening shutdown) the service day for a Homer–Williamsport round trip would be about 18 hours, which would allow six hours in any 24-hour day to adjust for the tide.

One way, the trip from Homer to Seldovia can be made in two hours, and two round trips per day, during daylight hours, are easily feasible. According to the schedule developed for this planning effort, the vessel could service Williamsport on seven days in a two-week period, and Seldovia on the other seven days.

In a 44-week service year (with ten weeks provided for annual maintenance), the vessel would call at Williamsport and Homer 154 times apiece, and at Seldovia 308 times. The proposed service concept would provide much more frequent service to Homer and Seldovia, which received 58 port calls apiece in 1997, according to the "AMHS 1997 Annual Traffic Volume Report." As configured for planning purposes, the service proposed would provide an annual passenger capacity of 15,092, compared to the *Tustumena's* 12,760.

Table 11
Seldovia Service Comparison

SELDOVIA			
	Tustumena	**New Vessel**	**Historical Demand**
Annual Trips	58	308	
Annual Passenger Capacity	12,760	15,092	2,303
Annual Vehicle Capacity	3,132	6,160	878
WILLIAMSPORT			
Annual Trips	NA	154	
Annual Passenger Capacity	NA	7,546	NA
Annual Vehicle Capacity	NA	3,080	NA

Note: Annual capacities and historical demand are stated on a one-way basis. Two-way capacities are exactly twice the one-way capacities. One-way historical demand is the larger of the historical demand values from either the Homer–Seldovia or the Seldovia–Homer trip directions.

Operating costs for the Homer–Williamsport–Seldovia marine service element of this alternative are summarized in Table 12.

Table 12
Homer–Seldovia–Williamsport Ferry Service
Operating Costs

	Minimum	Maximum
Shoreside Maintenance	$185,000	$185,000
Hull Maintenance & Pass. Services Maint.	$36,000	$44,000
Machinery Maintenance	$128,000	$156.000
Crew	$698,932	$833,152
Fuel	$159,000	$194,000
Lubricating Oil	$3,600	$4,400
Ports and Terminals O.H.	$223,176	$223,176
Management O.H.	$366,741	$366,741
Shoreside O.H.	$69	$69
Insurance	$19,000	$23,000
TOTAL: (Estimated Annual Operating Cost)	$1,819,518	$1,873,694

OPERATIONAL ISSUES

Williamsport would require substantial navigational improvements in order to accommodate AMHS service. Williamsport is located at the head of tide flats that go dry at low water. In addition, large boulders dot the shoal water approaches to Williamsport. Although shallow-draft vessels could presumably call briefly at high tide, dredging the channel would be required to service other types of vessels, including the basis vessel envisioned to provide the marine service in this alternative.

The U.S. Army Corps of Engineers (COE) completed a study exploring the feasibility of a dredging project at Williamsport in 1995. That report recommended excavation of a 2,700-meter long channel, ending at Williamsport, in Iliamna Bay. The channel bottom would be 30 meters wide at 0.5 below Mean Lower Low Water. The channel would end with a turning basin 5 meters long and 55 meters wide. The turning basin would provide access to a sheet-pile bulkhead dock and an adjacent paved, 8-meter wide launch. Capital costs for the project were estimated at $3,822,000, of which federal funding in the amount of $1,691,400 was identified as available, leaving $2,130,600 to non-federal sources. Annual M&O costs for the project were estimated at $185,000.[5]

The COE study conducted a rigorous benefit-cost analysis for the project, which determined that benefits would exceed costs at a 3.1:1.0 ratio. While the COE study determined that dredging a channel to Williamsport would be a worthwhile project, the lack of a local sponsor terminated further work on the project. However, it was noted that the project could proceed if a local sponsor, such as the State of Alaska, were secured.

Element 2. Williamsport to Pile Bay Roadway Link

Although a roadway currently exists between Williamsport and Pile Bay, it is quite primitive and in poor repair. The existing road is 15.5 miles long, consisting of one graded and drained earthen travel lane with no shoulder. In poor condition, the road is maintained only during the summer when a maintenance contractor is available. Portions of the road do not meet minimum width standards and are too narrow for current use. One of four bridges along the project corridor has washed out, and the others, all of which have sufficiency ratings below 50, are narrow and cannot accommodate oversized traffic. The major limitation restricting boat-haul traffic is the existing metal bridge across the Iliamna River, whose interior dimension of only 12 feet, is too narrow for the typical gillnet boat.

The project proposed in this link would reconstruct and widen the existing road to design standards applicable to a rural major collector traveled by 250 vehicles or less per day. The road's four bridges would be repaired, replaced, or widened, as appropriate. The road would be maintained year-round.

The road climbs 850 feet through the Chigmit Mountains in the first two miles benched on steep rock slopes. The road through this section is narrow and subject to avalanche hazards. As such, winter maintenance through this stretch would likely be difficult and expensive.

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[5] This maintenance cost includes annual grading of the dock, ramp, and staging area; annual surveys the first 4 years, then every 5 years; maintenance dredging every 5 years; replacement of fender piles, ramp concrete, and sheet-pile cathodic protection every 10 years; and replacement of the sheet pile after 30 years.

Total capital costs for this project are estimated at $14,857,500 for a paved surface, and $12,300,000 for a gravel surface. Annual M&O costs are estimated at $209,250 and $232,500 respectively. Demand as part of the full alternative is estimated at 4,200 person trips per year (Tables 19 and 21).

Element 3. Pile Bay to Iliamna Roadway Link

This roadway would complete a link from Williamsport through to Iliamna, allowing travel from Cook Inlet into the interior of the Lake and Peninsula Borough at least as far as Iliamna. The road would connect as far as Nondalton, given that Iliamna–Nondalton link has been programmed and is part of the baseline. This roadway link would provide Pile Bay and Pedro Bay access to the airport at Iliamna and would allow for a tourism circuit from Cook Inlet and potential access to Lake Clark National Park. The project would also provide the potential for interconnection of the electric power of the Tazimina Hydroelectric project.

This project would build 38 miles of new roadway between Iliamna and Pile Bay, passing through Pedro Bay. Although no road yet exists from Iliamna to Pile Bay, a 46-mile trail from Iliamna to Pedro Bay does exist, as does a 12-mile trail from to Pedro Bay to Pile Bay, denoted by the Alaska Department of Natural Resources as a RS2477 route. A likely corridor would follow the RS2477 trail route, traveling about half a mile inland from the northern shore of Lake Iliamna. As proposed, this road would cross about 15 creeks, which would require culvert placements or short-span bridges at these junctions. Like the other roadway links proposed in this regional plan, the road would be constructed to meet AASHTO design standards for a rural major collector with daily travel of under 250 vehicles per day.

The corridor envisioned consists of relatively easy terrain with numerous stream crossings. Construction would include typical fill construction techniques. No unusual construction or design issues are anticipated. Normal annual maintenance would be required for roadway upkeep. Because the area receives just over 60 inches of snow per year, plowing would probably account for the bulk of annual maintenance costs.

Total capital costs for this project are estimated at $51,870,000 for a paved surface, and $45,600,00 for a gravel surface. Annual M&O costs are estimated at $513,000 and $570,000, respectively. Demand for this roadway link is estimated at 17,900 person trips per year as an independent project and 32,400 person trips per year as a component of the alternative (Tables 19 and 21).

Element 4. Iliamna to Igiugig Roadway Link

The 56-mile road link proposed to connect the communities of Iliamna and Igiugig, which lie along the northern shores of Lake Iliamna, would cross lowlands dotted with many lakes, streams, and rivers. Bridges would be required to cross the Newhalen River, the Kvichak River, and many smaller rivers along the coast of Lake Iliamna. The 56-mile road would be built according to AASHTO design standards for a rural major collector serving 250 vehicle or less per day.

This project's major construction issues pertain to the development of bridges over the Newhalen and Kvichak Rivers. Construction materials would have to be barged in via the Kvichak River, and landings would have to be developed for staging. Permitting and land use concerns would also be an issue given the increase in traffic and the presence of structures

that may affect the fishing industry and other traditional area uses. Normal annual maintenance would be required for the bridge and roadway upkeep. Because total precipitation is 20 inches annually, including 45 inches of snowfall, snow removal would constitute the primary maintenance cost.

Total capital costs for this project have been estimated at $78,940,000 for a paved surface and $69,700,000 for a gravel surface. Annual M&O costs have been estimated at $756,000 and $840,000, respectively. Demand for this roadway link is estimated at 16,100 person trips per year as an independent project, 92,300 person trips per year as a component of the alternative, King Salmon option, and 106,100 person trips per year as a component of the alternative, Naknek Option (Tables 19 and 21).

Element 5a. Igiugig to Naknek Roadway Link

Constructing a 75-mile road between Igiugig and Naknek would provide one means of completing the proposed corridor from the Kenai Peninsula to Bristol Bay. This link would provide interior Southwest Alaska communities with ground access to the regional hub of King Salmon, where many goods and services are available.

The terrain between Igiugig and Naknek consists of coastlands and wetlands, with scattered lakes and ponds. The southwesterly route proposed along the Kvichak River would have to avoid numerous wetlands and lakes. Culverts to provide fish passage would be required at creek crossings, including Pecks Creek and Ole Creek. With the Kvichak River's turn to the south, the road alignment would parallel connecting into Hallersville from the north. The road would then be directed east and around the large mouth of the Wild and Scenic Alagnak River to an easier crossing of the river upstream. The crossing would take place approximately three miles east of Hallersville and then turn southwest toward the Kvichak River mouth. Once reaching Cape Horn, the road alignment would follow the pioneer route[6], which runs along the coast through Kvichak, Koggiung, and Libbyville before ending on the north side of Naknek.

Normal annual maintenance would be required for bridge and roadway upkeep. With total precipitation amounting to 20 inches annually, with 45 inches of snowfall, snow removal would require the bulk of the maintenance expenditure.

Total capital costs for this project have been estimated at $102,375,000 for a paved surface and $90,000,000 for a gravel surface. Annual M&O costs are estimated at $1,012,500 and $1,125,000, respectively.

Demand for this roadway link is estimated at 24,100 person trips per year as an independent project and 110,000 person trips per year as a component of the alternative (Table 21).

Element 5b. Igiugig to King Salmon Roadway Link (Alternative Route)

A 56-mile roadway between Igiugig and King Salmon would provide an alternative route to finish the overland crossing of the Alaska Peninsula connecting the Kenai Peninsula with

[6] This pioneer route is still used to access setnet sites along the coast.

Bristol Bay. Currently, passengers and freight are moved between Igiugig and King Salmon by aircraft or by boat along the Kvichak River with a transfer by road to King Salmon. The eastern portion of the terrain between these communities is characterized by large mountains and foothills to the north of Naknek Lake. The western portion of the area comprises coastlands and wetlands with scattered inland lakes and ponds.

Beginning in the village of Igiugig, the proposed roadway alignment would travel to the south-southwest, crossing Pecks Creek and Ole Creek along with many other small crossings. Continuing south-southwest, the alignment would require crossing the Alagnak River (a Wild and Scenic River) and would navigate along the foothills of the mountains north of Naknek Lake, outside of Katmai National Park and Preserve. The roadway would be routed to the southwest, crossing many branches of Pauls Creek and take a southerly bearing toward King Salmon Creek. Once the road alignment had crossed King Salmon Creek, it would travel along the banks until it connected into the pioneer road system, built by the U.S. Air Force north of King Salmon. After following the pioneer road southwest, the road would terminate on the northwest side of King Salmon at the Alaska Peninsula Highway.

Large river crossings, each of which would require fish passage culverts, are the primary construction issue for this link. With 20 inches of total precipitation annually, including 45 inches of snowfall, snow removal would account for the bulk of maintenance costs.

Total capital costs for this project have been estimated at $76,440,000 for a paved surface and $67,200,000 for a gravel surface. Annual M&O costs have been estimated at $756,000 and $840,000, respectively. Demand for this roadway link is estimated at 24,100 person trips per year as an independent project and 95,100 person trips per year as a component of the alternative (Table 19).

Element 6. Levelock Link to the Igiugig–Naknek Roadway

Building a connection between Levelock and the Igiugig–Naknek roadway link would integrate Levelock, which lies on the north shore of the Kvichak River, to the rest of the surface transportation corridor proposed in this alternative. This would permit the village of Levelock, (2020 base population forecast = 139) access to the larger communities of King Salmon and Naknek. This link could also serve as the beginning of a future route connecting the southwestern peninsula with communities further west, such as Dillingham.

The proposed 19-mile route, which would stem from the proposed link connecting Igiugig and Naknek, would require a 400-foot bridge across the Kvichak River. In addition, the proposed alignment would encounter several creeks, including Yellow Creek and Levelock Creek.

The terrain to be crossed in this proposed link is relatively flat, with occasional creek crossings that would require accommodation of fish passage. The bridge and roadway would require normal annual maintenance, most of which would be devoted to snow removal, insofar as the area receives about 20 inches of precipitation annual, including 45 inches of snowfall.

Total capital costs for this project have been estimated at $27,435,000 for a paved surface and $24,300,000 for a gravel surface. Annual M&O costs have been estimated at $256,500 and $285,000, respectively.

Demand for this roadway link is estimated at 15,000 person trips per year as an independent project and 39,600 person trips per year as a component of the alternative (Table 21).

Marine Options

Each of the four options for linking the Kenai Peninsula with Bristol Bay is the same as far west as Iliamna, at which point they diverge into two overland and two marine options. Discussed below are the two marine options for completing the stretch from Iliamna to Bristol Bay. Initially, the consultant team explored use of a shallow-draft landing vessel to provide service from Iliamna west to Bristol Bay along Lake Iliamna and the Kvichak River. However, initial analysis revealed that such service would be constrained by two factors: (1) winter ice; and (2) seasonally low water, which, combined, would restrict the navigable season from May to October. For this reason, Hovercraft service, which can negotiate both ice and shallow water, was also explored. The results of both sets of analysis are summarized below.

Element 7. Iliamna to Naknek Via Shallow-Draft Landing Vessel

Private and commercial vessels, including barges, are already in use on this waterway system. This option proposes ferry service along Lake Iliamna and the Kvichak River. Iliamna Lake is navigable between May 1 through October 31. While the lower reaches of the Kvichak River are navigable during the ice-free season, the upper reaches of the river are subject to seasonal low water that could impact navigability for some conventional vessels.

The vessel envisioned to provide this service is a shallow-draft landing vessel about 50 feet long, with a 16-foot beam, and with a running draft of approximately 14 inches. The vessel explored for planning purposes can accommodate two loaded full-sized pickup trucks and up to six passengers. The six-passenger threshold is highly desirable because this capacity would allow, according to USCG regulations, the service to operate with just two crew, each holding a USCG boat operator's license, a relatively easily acquired credential.

It would be possible, given the distances between ports served, to operate this service on a "dayboat" concept, which provides substantial operating cost savings, insofar as operations require no more than a single crew for no more than 12 hours per day of service. This would be feasible, providing that the vessel employed is capable of traveling comfortably in excess of the peak river current by a sufficient margin to make the transit in under 12 hours. For planning purposes, we currently believe that a 15-knot vessel could provide round trip service from the western terminus on a three-day turnaround basis (with two 12-hour layovers enroute). A 25-knot vessel could provide the same service on a two-day turnaround basis (with one 12-hour layover enroute). The schedule proposed for planning purposes would have Naknek, at the route's southern terminus, as its "home" port. Table 13 shows a model high-speed, shallow-draft, landing craft schedule for a typical voyage originating in Naknek and returning to Naknek at the end of the second day. Note that one 12-hour minimum layover is required on Iliamna Lake for crew rest.

Table 13
Model Schedule
High-Speed (25 knot), Shallow-Draft Landing Craft

	Arrival		Departure		Port Time	Sailing Time
	Day	**Time**	**Day**	**Time**	**Duration**	**Duration**
Naknek			Monday	6:00		1:16
Levelock	Monday	7:16	Monday	7:46	0:30	4:56
Igiugig	Monday	12:42	Monday	13:12	0:30	1:36
Newhalen	Monday	14:48	Monday	15:18	0:30	0:14
Iliamna	Monday	15:32	Monday	16:02	0:30	0:55
Pedro Bay	Monday	16:57	Monday	17:27	0:30	0:22
Pile Bay	Monday	17:49	Tuesday	5:49	12:00	1:36
Kokhanok	Tuesday	7:25	Tuesday	7:55	0:30	0:41
Newhalen	Tuesday	8:36	Tuesday	9:06	0:30	0:41
Kokhanok	Tuesday	9:47	Tuesday	10:17	0:30	0:41
Newhalen	Tuesday	10:58	Tuesday	11:28	0:30	1:36
Igiugig	Tuesday	13:04	Tuesday	13:34	0:30	1:59
Levelock	Tuesday	15:33	Tuesday	16:03	0:30	1:04
Naknek	Tuesday	17:07				

Although accommodating the vessel envisioned to provide service on this link would not require extensive or particularly expensive shoreside infrastructure, some minor landing area upgrades, such as road extensions and gravel or concrete pads, would be needed. Accordingly, the costs of such improvements have been estimated at $25,000 at each of eight ports proposed for service, for a total of $200,000. In addition, navigation aids needed on the Kvichak River itself have been estimated at a cost of $50,000. Combined M&O costs for all shoreside improvements have been estimated at $6,250 annually.

In addition to the shoreside improvements just mentioned, of course a new vessel would have to be acquired – at an estimated cost of $526,000. Vessel-related M&O costs, which include crew, fuel, insurance and overhead, are estimated at $318,300. The total cost breakdown for this project is provided in Table 14.

Table 14
Capital and M&O Costs for Proposed Lake Iliamna/Kvichak River Marine Link
(Shallow-Draft Landing Vessel Option)

Vessel Acquisition Cost	$481,000 F.O.B. Seattle $45,000 Delivery by barge	
Subtotal: (Acquisition Cost)	$526,000	
	Minimum	**Maximum**
Hull Maintenance	$1,500	$2,000
Machinery Maintenance	$4,000	$5,500
Crew	$144,000	$223,000
Fuel	$90,000	$110,000
Lubricating Oil	$1,200	$1,400
Berthing	$3,000	$4,000
Insurance	$22,000	$25,000
Subtotal: (Annual Operating Cost)	$265,700	$370,900

Table 15
Capital and M&O Costs
Shoreside Improvements

Landing area upgrades (road extensions, gravel or concrete pads, etc.) at eight (8) communities (Allowance: 8x$25,000)	$200,000	
Aids to navigation on Kvichak River	$50,000	
Subtotal: (Acquisition Cost)	$250,000	
	Minimum	**Maximum**
Annual Maintenance	$5,500	$7,000
Subtotal: (Annual Operating Cost)	$5,500	$7,000

Demand for this service link is estimated at 3,600 person trips per year.

Element 8. Iliamna to Egegik Marine Service via Hovercraft

Hovercraft, which can operate at speeds over 40 knots over land, ice cover, seas with up to four-foot waves, beaches, and shallow water, were also explored as a means of linking the western portion of the Kenai Peninsula to Bristol Bay corridor. Two models of hovercraft with extensive Alaskan operating experience were explored in analyzing this option: the turbine-powered LACV-30 type hovercraft and the conventionally-powered AP.1-88. Of the two, the

AP.1-88 was found to be more suitable for Lake Iliamna–Kvichak River service, due to its smaller size, lower operating costs, and lower noise impacts.[7] Like the shallow-draft landing vessel option described above, crew costs for hovercraft operations would be relatively low. It is possible that the AP.1-88 could be operated with a crew of two: a master, who would have to have a USCG hovercraft endorsement,[8] and a mate to crew the aft compartment.[9]

Using a hovercraft rather than a shallow-draft landing vessel to connect the communities along Lake Iliamna and the Kvichak River would have several advantages over the use of a shallow-draft landing vessel:

- **Longer service period**. Hovercraft operation would offer the advantage of a year-round, as opposed to May through October service season. Unlike a shallow-draft vessel, the Hovercraft would be able to operate over the winter ice of Lake Iliamna, and probably over the Kvichak River's ice. However, the Hovercraft would likely be out of service for about 20 days each for the periods of winter freezeup and spring thaw, which could be scheduled for annual maintenance. In any case, the total service period of the Hovercraft would be approximately 46 weeks compared to 26 weeks for the shallow-draft vessel.
- **Fewer shoreside improvements required**. The AP.1-88 is able to utilize an unimproved or minimally improved loading/unloading facility, unlike a shallow-draft landing vessel, which would require landing pads.
- **Freight-carrying flexibility**. The version of the AP.1-88 currently operating in Alaska is configured for 24 passengers with adjustable interior bulkhead to accommodate freight. The aft superstructure doors are wide enough to pas a full size pallet.

Some disadvantages associated with hovercraft operations have also been identified:

- **Noise**. Although the diesel-powered AP.1-88 is not as noisy as the turbine-powered LACV-30, it is relatively noisy compared to the conventional hull option. In any case, current hovercraft operations in Bethel, Alaska, on behalf of the U.S. Postal Service will provide an opportunity to assess noise impacts firsthand.
- **Limited payload**. Although the AP.1-88's 16,000-pound cargo capacity slightly exceeds that of the shallow-draft landing vessel, its deadweight capacity is modest. However, given early, planning-level demand estimates, it is thought to be sufficient.
- **Relatively high maintenance costs**. Although maintenance costs for Hovercraft are not well established, they are presumed to be higher than those for conventional hull craft, due to two factors: (1) their higher level of mechanical sophistication; and (2) wear and tear on the craft's rubber skirt. In addition, it would be necessary to wash the craft down when operating over brackish water near Naknek in order to prevent salt water damage to the air screws and other machinery.

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[7] Although other hovercraft are commercially available, most are much smaller and would not meet the projects freight and passenger load requirements envisioned in this option. In addition, two existing AP.1-88 vessels, although built in Canada, have unrestricted Jones Act waivers allowing their use in the United States.

[8] A hovercraft endorsement from the USCG can be earned upon completion of 36 hours of classroom study and 36 hours of operating time.

[9] Although the mate need not be fully qualified, he or she must have a radar rating.

MODEL SCHEDULE

The AP.1-88 hovercraft is fast enough that the highly desirable result of 12-hour dayboat operation would be achievable. In fact, Table 17 shows a model schedule based on the following operating speeds: 40 knots per hour on the lower Kvichak River, 30 knots on the upper Kvichak River, and 50 knots on Lake Iliamna. In order to maintain 12-hour service days, port calls are limited to 20 minutes. This model schedule accomplishes the daily round trip in 11 hours, allowing a half hour in the morning for startup and a half hour in the evening for shutdown. For the purposes of illustrating this schedule, Naknek serves as homeport.

The acquisition cost for an AP.1-88 hovercraft is estimated in the range of $5 to $6 million, depending on classification and regulatory requirements, outfitting, delivery costs, and acquisition scheme. A summary of estimated Hovercraft operating costs is provided in Table 18.

Table 16
AP.1-88 Hovercraft

Annual Operating Costs	
Maintenance	$1,408,000
Crew	237,250
Fuel	14,608
Lubricating oil	2,282
Subtotal	$1,662,140
Miscellaneous (4%)	66,460
Total	**$1,728,600**

The operating cost summary contained in Table 18 assumes that hovercraft service is provided five days a week except during break-up and freeze-up, for which 20 days apiece are allocated and assumed to be used for annual maintenance.

Demand for this service link is estimated at 6,900 passenger trips.

Table 17
Model Schedule
(40 kt lower river; 30 kt upper river; 50 kt lake)

	Arrival		Departure		Port Time	Sailing Time
	Day	**Time**	**Day**	**Time**	**Duration**	**Duration**
Naknek			Same Day	6:30		0:45
Levelock	Same Day	7:15	Same Day	7:35	0:20	1:30
Igiugig	Same Day	9:05	Same Day	9:25	0:20	0:50
Newhalen	Same Day	10:15	Same Day	10:35	0:20	0:10
Iliamna	Same Day	10:45	Same Day	11:05	0:20	0:30
Pedro Bay	Same Day	11:35	Same Day	11:55	0:20	0:15
Pile Bay	Same Day	12:10	Same Day	12:30	0:20	0:50
Kokhanok	Same Day	13:20	Same Day	13:40	0:20	0:50
Igiugig	Same Day	14:30	Same Day	14:50	0:20	1:30
Levelock	Same Day	16:20	Same Day	16:40	0:20	0:45
Naknek	Same Day	17:25				

Table 18
Cost Synopsis
Cook Inlet to Bristol Bay Overland
King Salmon Option

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized Capital plus O&M costs
Marine Elements				
Homer–Williamsport–Seldovia Marine	$1,846,606	$2,750,000	$259,581	$1,921,187
Homer–W–S shoreside	$185,000	$3,822,000	$360,770	$545,770
Roadway Elements				
Williamsport to Pile Bay				
Paved	$209,250	$14,857,500	$1,402,443	$1,611,693
Unpaved	$232,500	$12,300,000	$1,161,033	$1,393,533
Pedro Bay to Pile Bay to Iliamna				
Paved	$513,000	$51,870,000	$4,896,161	$5,409,161
Unpaved	$570,000	$45,600,000	$4,304,317	$4,874,317
Iliamna to Igiugig				
Paved	$756,000	$78,940,000	$7,451,378	$8,207,378
Unpaved	$840,000	$69,700,000	$6,579,187	$7,419,187
Igiugig to King Salmon				
Paved	$756,000	$76,440,000	$7,215,395	$7,971,395
Unpaved	$840,000	$67,200,000	$6,343,205	$7,183,205
TOTAL				
Paved Option	$4,778,856	$228,679,500	$21,585,727	$25,666,583
Unpaved Option	$5,084,106	$201,372,000	$19,008,092	$23,337,198

Table 19
2020 Annual Travel Demand Estimate
Cook Inlet to Bristol Bay Overland
King Salmon Option

	Independent*	Alternative**	System***
Marine Elements			
Homer–Seldovia		4,000	
Homer–Williamsport		4,200	
Roadway Elements			
Williamsport to Pile Bay to Pedro Bay		4,200	
Pedro Bay to Iliamna	17,900	32,400	33,700
Iliamna to Igiugig	16,100	92,300	101,300
Igiugig to King Salmon	24,100	95,100	108,300

* Demand on the link as an independent element.
** Demand on the link as part of the alternative.
*** Demand on the link assuming implementation of a Cook Inlet to Bristol Bay to Alaska Peninsula roadway system.

Table 20
Cost Synopsis
Cook Inlet to Bristol Bay, Overland
Naknek Option

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized cap cost plus O&M Cost
Marine Elements				
Homer–Williamsport–Seldovia	$1,846,606	$2,750,000	$259,581	$1,921,187
Homer–W–S Shoreside	$185,000	$3,822,000	$360,770	$545,770
Roadway Elements				
Williamsport–Pile Bay				
Paved	$209,250	$14,857,500	$1,402,443	$1,611,693
Unpaved	$232,500	$12,300,000	$1,161,033	$1,393,533
Iliamna–Pedro Bay–Pile Bay				
Paved	$513,000	$51,870,000	$4,896,161	$5,409,161
Unpaved	$570,000	$45,600,000	$4,304,317	$4,874,317
Iliamna to Igiugig				
Paved	$756,000	$78,940,000	$7,451,378	$8,207,378
Unpaved	$840,000	$69,700,000	$6,579,187	$7,419,187
Igiugig to Naknek				
Paved	$1,012,500	$102,375,000	$9,663,476	$10,675,976
Unpaved	$1,125,000	$90,000,000	$8,495,363	$9,620,363
Igiugig to Levelock				
Paved	$256,500	$27,435,000	$2,589,670	$2,846,170
Unpaved	$285,000	$24,300,000	$2,293,748	$2,578,748
TOTAL				
Paved Option	$4,778,856	$282,049,500	$26,623,478	$31,217,334
Unpaved Option	$5,084,106	$248,472,000	$23,453,999	$28,353,105

Table 21
2020 Annual Travel Demand Estimate
Cook Inlet to Bristol Bay Overland
Naknek Option

	Independent*	Alternative**	System***
Marine Elements			
Homer–Seldovia		4,000	
Homer–Williamsport		4,200	
Roadway Elements			
Williamsport to Pile Bay		4,200	
Pile Bay to Pedro Bay to Iliamna	17,900	32,400	33,700
Iliamna to Igiugig	16,100	106,100	115,100
Igiugig to Naknek	24,100	110,000	123,200
Igiugig to Levelock	15,000	39,600	43,800

* Demand on the link as an independent element.

** Demand on the link as part of the alternative.

*** Demand on the link assuming implementation of a Cook Inlet to Bristol Bay to Alaska Peninsula roadway system.

Table 22
Cost Synopsis
Cook Inlet to Bristol Bay Marine
Hovercraft Option

	Annual O&M Cost	Total Capital Cost	Annualized Capital Cost @ 7% Interest	Annual Capital plus O&M costs
Marine Elements				
Homer–Williamsport-Seldovia	$1,846,606	$2,750,000	$259,581	$1,921,187
Homer–Williamsport Shoreside	$185,000	$3,822,000	$360,770	$545,770
Lake Iliamna (Hovercraft)	$1,728,600	$5,500,000	$519,161	$2,247,761
Roadway Elements				
Williamsport–Pile Bay				
Paved	$209,250	$14,857,500	$1,402,443	$1,611,693
Unpaved	$232,500	$12,300,000	$1,161,033	$1,393,533
TOTAL				
Paved Option	$3,969,456	$26,929,500	$2,541,954	$6,326,410
Unpaved Option	$3,992,706	$24,372,000	$2,300,544	$6,108,250

Table 23
2020 Annual Travel Demand Estimate
Cook Inlet to Bristol Bay Marine
Hovercraft Option

	Travel Demand
Marine Elements	
Homer–Seldovia	4,000
Homer–Williamsport	4,200
Lake Iliamna Hovercraft Service	6,900
Roadway Elements	
Williamsport to Pedro Bay	4,200
Pedro Bay to Iliamna	22,100

Table 24
Cost Synopsis
Cook Inlet to Bristol Bay Marine
Shallow-Draft Landing Vessel Option

	Annual O&M Cost	Total Capital Cost	Annualized Capital Cost @7% Interest	Annual Capital plus O&M costs
Marine Elements				
Homer–Williamsport–Seldovia*	$1,846,606	$2,750,000	$259,581	$1,921,187
Homer, Williamsport Shoreside	$185,000	$3,822,000	$360,770	$545,770
Lake Iliamna (Shallow-Draft Vessel)**	$318,300	$526,000	$49,651	$367,951
Lake Iliamna Shoreside	$6,250	$250,000	$23,598	$29,848
Roadway Elements				
Williamsport–Pile Bay				
Paved	$209,250	$14,857,500	$1,402,443	$1,611,693
Unpaved	$232,500	$12,300,000	$1,161,033	$1,393,533
TOTAL				
Paved Option	$2,565,406	$22,205,500	$2,096,042	$4,476,448
Unpaved Option	$2,588,656	$19,648,000	$1,854,632	$4,258,288

*Vehicle demand for this element of the alternative was estimated at 2,800 vehicles/year.
**Vehicle demand for this element of the alternative was estimated at 770 vehicles/year.

Table 25
2020 Annual Travel Demand Estimate
Cook Inlet to Bristol Bay
Shallow-Draft Landing Vessel Option

	Travel Demand
Marine Elements	
Homer–Seldovia	4,000
Homer–Williamsport	4,200
Lake Iliamna Marine Service (S.D.)	3,600
Roadway Elements	
Williamsport to Pedro Bay	4,200
Pedro Bay to Iliamna	22,100

3. DEDICATED *TUSTUMENA*

This alternative would remove the *Tustumena* from service in Prince William Sound and dedicate her to service in Southwest Alaska. Desire for improved AMHS service to the region has been expressed through the Southwest Alaska Plan Advisory Committee and through resolutions issued by the Southwest Alaska Municipal Conference. In light of concurrent planning efforts in Prince William Sound, which currently shares *Tustumena* service with Southwest Alaska, such an initiative may soon be feasible insofar as alternatives being considered in Prince William Sound include new vessels, which would make it somewhat easier logistically to free the *Tustumena* up for additional service in Southwest Alaska.

Two variations on the theme of a dedicated *Tustumena* are presented herein: (A) a service schedule that would make two trips every four weeks to the Aleutians; and (B) a service schedule that would make one trip to the Aleutians every four weeks. Under Option A, Kodiak would on average receive service every third day, and the Alaska Peninsula and the Aleutians would receive service twice a month. Under Option B, Kodiak would still receive service approximately every third day, but the Alaska Peninsula and the Aleutians would receive service once a month.

Because this alternative, unlike any of the others in the study, represents a reallocation of existing service, rather than new service involving both new capital expenditures and new M&O estimates, it was possible and appropriate to perform the analysis necessary to develop this alternative at a higher level of detail.

Table 26
Dedicated *Tustumena*

	Annual O&M Cost	Estimated Revenues	Net Subsidy Required
Current *Tustumena* Operations	$7,709,000	$3,276,000	$4,433,000
Dedicated *Tustumena* Alternative			
Option A	$7,718,848	$4,637,000	$3,082,000
Option B	$7,717,010	$4,620,000	$3,097,000

Option A
(Two trips to Aleutians per four-week cycle)

The Southwest Alaska communities located on the southern side of the Alaska Peninsula and on Kodiak Island need and desire improved marine transportation services. The communities on the southern side of the Alaska Peninsula currently receive about seven trips per year by the *Tustumena*. The *Tustumena* and the *Kennicott* are currently the only vessels owned and operated by AMHS with the U.S. Coast Guard ocean certification necessary to serve these communities. The *Kennicott* is currently programmed with a primary mission as a Southeast Alaska mainline vessel with a secondary mission to replace the *Tustumena* during the *Tustumena's* annual maintenance period. The *Kennicott* also provides service approximately once a month across the Gulf of Alaska, connecting Southeast Alaska with Prince William Sound and the Kenai Peninsula. It is unlikely that any significant increase in *Kennicott* availability for service to Southwest Alaska will develop in the foreseeable future.

On the other hand, the *Tustumena* currently expends 25.6% of its annual vessel miles and approximately 27.4% of its annual operating time in service to Prince William Sound. A separate transportation planning process for Prince William Sound has identified that future Prince William Sound marine transportation needs may be better met by new day boats, provided either by higher speed conventional monohulls or modern high-speed vessels. If such improvements were implemented for Prince William Sound, then the *Tustumena* could become available for increased service in Southwest Alaska.

This technical memorandum explores possible service improvements in the Southwest Alaska region that might accrue from dedicating the *Tustumena* to Southwest Alaska service exclusively, including, in particular, a substantial increase in service to the southern coastal communities of the Alaska Peninsula and the Aleutian Island out to Unalaska.

EXISTING CONDITIONS

Based on the "AMHS 1997 Annual Traffic Volume Report," the *Tustumena* made 699 trips in 1997 while traveling 64,109 nautical miles. She carried 34,854 passengers and 12,588 vehicles in 1997. The distribution of 1997 *Tustumena* service is summarized in the Table 27, Table 28, Table 29 and Table 30.

Table 27
1997 *Tustumena* Service Summary in Prince William Sound

Prince William Sound										
	Passenger			Vehicles				Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Chenega-Cordova	100	9,700	5.2%	69	6,693	23.5%	9	97	873	64.7
Chenega-Seward	44	2,552	2.6%	67	3,886	28.8%	8	58	464	34.4
Chenega-Valdez	1,155	100,485	42.3%	338	29,406	69.8%	13	87	1,131	83.8
Cordova-Chenega	45	4,365	3.0%	67	6,499	33.0%	7	97	679	50.3
Cordova-Seward	97	13,968	3.8%	74	10,656	21.0%	12	144	1,728	128.0
Cordova-Tatitlek	567	28,350	20.7%	186	9,300	38.0%	13	50	650	48.2
Cordova-Valdez	954	70,596	13.7%	207	15,318	17.1%	33	74	2,442	180.9
Seward-Chenega	1,252	72,616	25.9%	412	23,896	49.3%	23	58	1,334	98.8
Seward-Cordova	85	12,240	3.6%	78	11,232	21.9%	11	144	1,584	117.3
Tatitlek-Cordova	432	21,600	17.1%	102	5,100	21.7%	12	50	600	44.4
Tatitlek-Valdez	549	12,078	20.1%	187	4,114	38.2%	13	22	286	21.2
Valdez-Cordova	1,056	78,144	14.7%	244	18,056	21.0%	34	74	2,516	186.4
Valdez-Seward	1,092	157,248	40.0%	326	46,944	64.9%	13	144	1,872	138.7
Valdez-Tatitlek	399	8,778	15.8%	97	2,134	20.3%	12	22	264	19.6
Total	**7,827**	**592,720**		**2,454**	**193,234**		**213**		**16,423**	**1,217**

Table 28
1997 *Tustumena* Service Summary for
Kenai Peninsula and Kodiak Island

Kenai Peninsula and Kodiak Island										
	Passenger			Vehicles				Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Homer-Kodiak	3,043	413,848	39.1%	932	126,752	70.7%	37	136	5,032	372.7
Homer-Port Lions	2,305	308,870	30.4%	927	124,218	71.4%	36	134	4,824	357.3
Homer-Seldovia	2,303	39,151	18.9%	878	14,926	43.9%	58	17	986	73.0
Kodiak-Homer	3,101	421,736	37.8%	870	118,320	60.7%	39	136	5,304	392.9
Kodiak-Port Lions	1,780	85,440	24.9%	718	34,464	56.7%	34	48	1,632	120.9
Kodiak-Seward	1,717	317,645	23.3%	806	149,110	66.7%	35	185	6,475	479.6
Port Lions-Homer	1,797	240,798	25.1%	695	93,130	55.2%	34	134	4,556	337.5
Port Lions-Kodiak	2,209	106,032	29.2%	922	44,256	71.2%	36	48	1,728	128.0
Seldovia-Homer	2,187	37,179	17.9%	827	14,059	41.2%	58	17	986	73.03
Seward-Kodiak	1,682	311,170	22.8%	842	155,770	69.1%	35	185	6,475	479.6
Total	**22,124**	**2,281,869**		**8,417**	**875,005**		**402**		**37,998**	**2,815**

Table 29
1997 *Tustumena* Service Summary for Alaska Peninsula and Aleutians

Alaska Peninsula & Aleutians										
	Passenger			Vehicles			Trips	Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Akutan-Cold Bay	279	44,092	18.9%	117	18,486	44.7%	7	158	1,106	81.9
Chignik-Kodiak	491	122,259	33.4%	209	52,041	78.3%	7	249	1,743	129.1
Chignik-Sand Point	400	55,200	27.2%	156	21,528	57.3%	7	138	966	71.6
Cold Bay-False Pass	411	23,838	27.9%	74	4,292	27.9%	7	58	406	30.1
Cold Bay-King Cove	321	8,025	21.8%	158	3,950	60.4%	7	25	175	13.0
False Pass-Unalaska	395	40,685	26.8%	76	7,828	28.4%	7	103	721	53.4
King Cove-Cold Bay	488	12,200	33.1%	108	2,700	42.3%	7	25	175	13.0
King Cove-Sand Point	380	37,240	25.8%	174	17,052	66.5%	7	98	686	50.8
Kodiak-Chignik	513	127,737	34.8%	203	50,547	75.7%	7	249	1,743	129.1
Sand Point-Chignik	339	46,782	23.0%	177	24,426	66.4%	7	138	966	71.6
Sand Point-King Cove	541	53,018	36.8%	148	14,504	56.4%	7	98	686	50.8
Unalaska-Akutan	345	15,525	23.4%	117	5,265	44.7%	7	45	315	23.3
Total	**4,903**	**586,591**		**1,717**	**222,619**		**84**		**9,688**	**717.6**

Table 30
Summary of 1997 *Tustumena* Service by Sub-Region

Summary by Sub-Region							
	Passenger		Vehicles			Vessel	Transit
	Count	Miles	Count	Miles	Trips	Miles	Hours
Prince William Sound	7,827	592,720	2,454	193,234	213	16,423	1,217
Kodiak-Kenai Pen.	22,124	2,281,869	8,417	875,005	402	37,998	2,815
Alaska Pen. & Aleutians	4,903	586,591	1,717	222,619	84	9,688	718
Total	**34,854**	**3,461,180**	**12,588**	**1,290,858**	**699**	**64,109**	**4,749**

It may be seen that the *Tustumena* vessel miles and transit hours expended in Prince William Sound are more than sufficient to permit a 100 percent increase in service to the Alaska Peninsula and Aleutians without any reduction in service to Kodiak and the Kenai Peninsula. However, from a vessel revenue perspective it would appear that shifting *Tustumena* service from Prince William Sound to the Alaska Peninsula and Aleutians would entail a reduction in annual passengers and vehicles carried.

Table 31 shows an estimate of the distribution of annual operating hours. Average port time for the various sub-regions is estimated based on a review and analysis of the 1998–1999 schedule for the *Tustumena*.

Table 31
Estimated Distribution of 1997 *Tustumena* Operating Hours by Sub-Region

Summary by Sub-Region					
		Vessel	Transit	Avg. Port	Total
	Trips	Miles	Hours	Time	Operating Hours
Prince William Sound	213	16,423	1,217	893	2,110
Kodiak-Kenai Pen.	402	37,998	2,815	1,686	4,500
Alaska Pen. & Aleutians	84	9,688	718	352	1,070
Total	**699**	**64,109**	**4,749**	**2,931**	**7,680**

The approximately 2,110 hours that the *Tustumena* currently spends annually in Prince William Sound service could provide for a doubling of the current 1,070 hours of Alaska Peninsula and Aleutian Island service and still provide an almost equal number of hours (1,030) for service improvements elsewhere in the Southwest Alaska region (e.g., in particular an increase in the level of service to the southern coastal communities of the Alaska Peninsula and Aleutian Islands out to Unalaska).

OPTION A (TWO TRIPS TO ALEUTIANS PER FOUR-WEEK CYCLE)

Guiding Principles for Increased Service

The following are identified for the purposes of this technical memorandum as guiding principles for increased service from the *Tustumena* to the Southwest Alaska region:

- Service to the southern communities of the Alaska Peninsula and the Aleutian Islands out to Unalaska should be increased to two trips per month.
- The annual number of trips linking Kodiak to the Kenai Peninsula should be maintained at or near current levels.
- The annual number of trips linking Port Lions to the Kenai Peninsula should be maintained at or near current levels.

- The annual number of trips linking Port Lions to Kodiak should be maintained at or near current levels.
- Trips linking Kodiak (and/or Port Lions) to Homer may be substituted for trips linking Kodiak (and/or Port Lions) to Seward. Each such substitution has the effect of recovering approximately 3.6 hours of transit time (for a one-way transit) due to the shorter distance between Kodiak and Homer as compared to Kodiak to Seward.
- The *Tustumena* currently links Seldovia with Homer. In 1997 the *Tustumena* made 58 trips to Seldovia (*Tustumena* made 73 arrivals at Homer during 1997 from either Kodiak or Port Lions). As a separate aspect of the Southwest Alaska Transportation Plan, a new ferry linking Homer and Williamsport is proposed. That same ferry could also provide service linking Seldovia and Homer with equal or greater frequency of service and capacity compared to the service currently provided by the *Tustumena*. Accordingly an assumption for the purposes of this technical memorandum is that the *Tustumena* will cease to be the vessel providing ferry service between Seldovia and Homer.
- Similarly, False Pass is currently served only one-way (westbound) by the *Tustumena*. For the purposes of this technical memorandum, it is assumed that the *Tustumena* will call at False Pass both westbound and eastbound.
- Studies are currently underway, and substantial Federal funding has been provided for a surface transportation link between King Cove and Cold Bay. The new link, when completed, will presumably be either an all road link or a combination of some new road and a ferry operating on the waters of Cold Bay (perhaps operating from Lenard Harbor). Once this surface link is in place, it is thought to be unnecessary for the *Tustumena* to call at both King Cove and Cold Bay. Accordingly, for the purposes of this technical memorandum, it is assumed that the *Tustumena* will call only at King Cove.

Service to Kodiak and Port Lions

Historical levels of service connecting Kodiak Island to the Kenai Peninsula are summarized in Table 32.

Table 32
1997 *Tustumena* Service Between Kodiak or Port Lions and the Kenai Peninsula

Kenai Peninsula & Kodiak Island										
	Passenger			Vehicles				Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Homer-Kodiak	3,043	413,848	39.1%	932	126,752	70.7%	37	136	5,032	372.7
Homer-Port Lions	2,305	308,870	30.4%	927	124,218	71.4%	36	134	4,824	357.3
Kodiak-Homer	3,101	421,736	37.8%	870	118,320	60.7%	39	136	5,304	392.9
Kodiak-Seward	1,717	317,645	23.3%	806	149,110	66.7%	35	185	6,475	479.6
Port Lions-Homer	1,797	240,798	25.1%	695	93,130	55.2%	34	134	4,556	337.5
Seward-Kodiak	1,682	311,170	22.8%	842	155,770	69.1%	35	185	6,475	479.6
Total	**13,645**	**2,014,067**		**5,072**	**767,300**		**216**		**32,666**	**2,420**

Historical levels of service connecting Kodiak with the Kenai Peninsula are summarized in Table 33.

Table 33
1997 *Tustumena* Service Between Kodiak and the Kenai Peninsula

Kenai Peninsula & Kodiak										
	Passenger			Vehicles			Trips	Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio		Length (n.m.)	Miles	Hours
Homer-Kodiak	3,043	413,848	39.1%	932	126,752	70.7%	37	136	5,032	372.7
Kodiak-Homer	3,101	421,736	37.8%	870	118,320	60.7%	39	136	5,304	392.9
Kodiak-Seward	1,717	317,645	23.3%	806	149,110	66.7%	35	185	6,475	479.6
Seward-Kodiak	1,682	311,170	22.8%	842	155,770	69.1%	35	185	6,475	479.6
Total	**9,543**	**1,464,399**		**3,450**	**549,952**		**146**		**23,286**	**1,725**

Historical levels of service connecting Port Lions and the Kenai Peninsula are summarized in Table 34.

Table 34
1997 *Tustumena* Service Between Port Lions and the Kenai Peninsula

Kenai Peninsula & Port Lions										
	Passenger			Vehicles				Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Homer-Port Lions	2,305	308,870	30.4%	927	124,218	71.4%	36	134	4,824	357.3
Port Lions-Homer	1,797	240,798	25.1%	695	93,130	55.2%	34	134	4,556	337.5
Total	**4,102**	**549,668**		**1,622**	**217,348**		**70**		**9,380**	**695**

Historical levels of service between Port Lions and Kodiak are summarized in Table 35.

Table 35
1997 *Tustumena* Service Between Port Lions and Kodiak

Port Lions & Kodiak										
	Passenger			Vehicles				Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Kodiak-Port Lions	1,780	85,440	24.9%	718	34,464	56.7%	34	48	1,632	120.9
Port Lions-Kodiak	2,209	106,032	29.2%	922	44,256	71.2%	36	48	1,728	128.0
Total	**3,989**	**191,472**		**1,640**	**78,720**		**70**		**3,360**	**249**

Service to Seldovia

As described above, it is presumed that service between Seldovia and Homer will be assumed by a new ferry also providing service between Homer and Williamsport. The historical level of service to Seldovia that should be equaled or exceeded is summarized in Table 36.

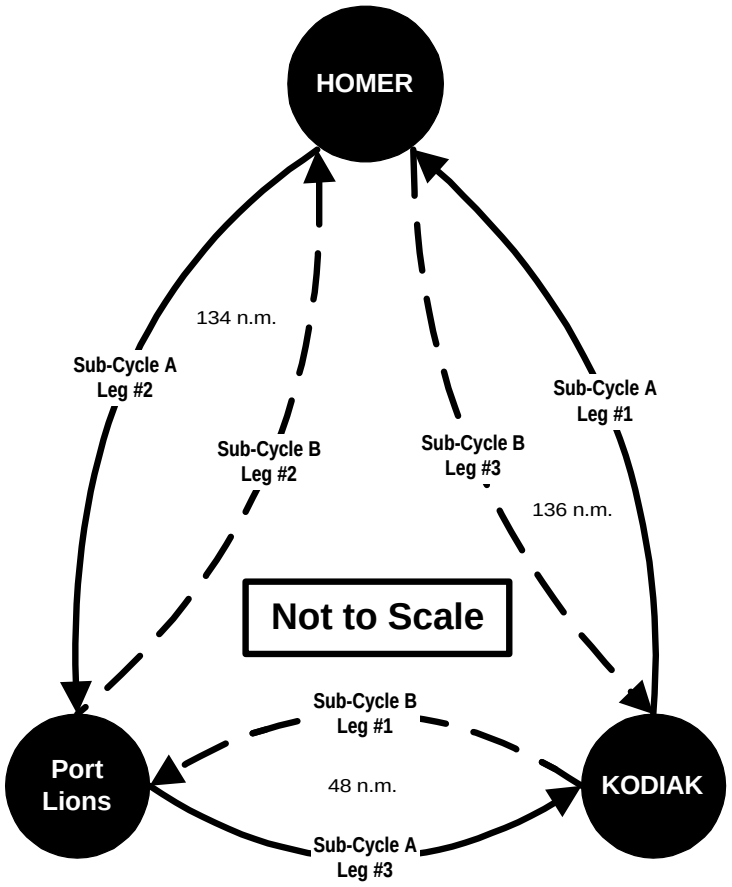
Table 36
1997 *Tustumena* Service Between Seldovia and Homer

Seldovia and Homer										
	Passenger			Vehicles				Link	Vessel	Transit
	Count	Miles	Capacity Ratio	Count	Miles	Capacity Ratio	Trips	Length (n.m.)	Miles	Hours
Homer-Seldovia	2,303	39,151	18.9%	878	14,926	43.9%	58	17	986	73.0
Seldovia-Homer	2,187	37,179	17.9%	827	14,059	41.2%	58	17	986	73.0
Total	**4,490**	**76,330**		**1,705**	**28,985**		**116**		**1,972**	**146**

Model Schedule

A model 28-day "Option A" schedule for the *Tustumena* was developed in Microsoft *Project* (Figure 3).

Figure 3
Kodiak Cycle #1



Kodiak Cycle #1: Requires 60 hours

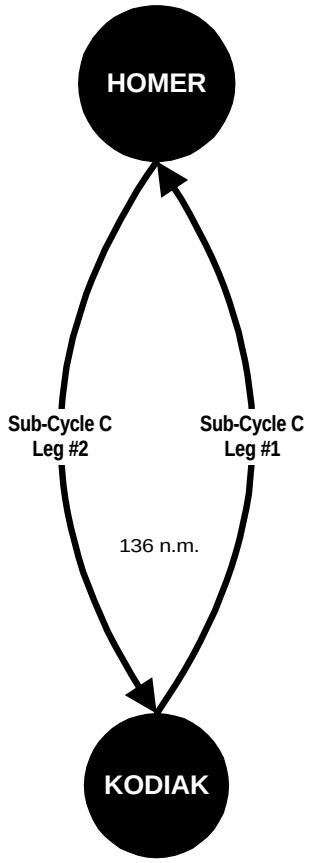
Sub-Cycle A: Kodiak - Homer - Port Lions - Kodia

Sub-Cycle B: Kodiak - Port Lions - Homer - Kodia

Table 37
Kodiak Cycle #1 (Including Port Lions)

		2400 hour clock		Decimal Hours			
	Day #	**Arrive**	**Depart**	**Transit Duration**	**Port Time**	**Link Duration**	**Cumulative Duration**
Kodiak	1		0000 hrs			0.0 hrs	0.0 hrs
Homer	1	0930 hrs	1130 hrs	9.5 hrs	2.0 hrs	11.5 hrs	11.5 hrs
Port Lions	1	2145 hrs	2215 hrs	10.25 hrs	0.5 hrs	10.75 hrs	22.25 hrs
Kodiak	2	0030 hrs	0615 hrs	2.25 hrs	5.75 hrs	8.0 hrs	30.25 hrs
Port Lions	2	0830 hrs	0900 hrs	2.25 hrs	0.5 hrs	2.75 hrs	33.0 hrs
Homer	2	1900 hrs	2100 hrs	10.0 hrs	2.0 hrs	12.0 hrs	45.0 hrs
Kodiak	3	0630 hrs	1200 hrs	9.5 hrs	5.5 hrs	15.0 hrs	60.0 hrs

Figure 4
Kodiak Cycle #2



Not to Scale

Kodiak Cycle #2: Requires 48 hours

Sub-Cycle C: Kodiak - Homer - Kodiak

Table 38
Kodiak Cycle #2 (Excluding Port Lions)

	Day #	2400 hour clock		Decimal Hours			
		Arrive	**Depart**	**Transit Duration**	**Port Time**	**Link Duration**	**Cumulative Duration**
Kodiak	1		0000 hrs			0.0 hrs	0.0 hrs
Homer	1	0930 hrs	1130 hrs	9.5 hrs	2.0 hrs	11.5 hrs	11.5 hrs
Kodiak	1	2100 hrs	0000 hrs	9.5 hrs	3.0 hrs	12.5 hrs	24.0 hrs
Homer	2	0930 hrs	1130 hrs	9.5 hrs	2.0 hrs	11.5 hrs	35.5 hrs
Kodiak	2	2100 hrs	0000 hrs	9.5 hrs	3.0 hrs	12.5 hrs	48.0 hrs

Table 39
Aleutian Cycle, Option A

	Day #	2400 hour clock		Decimal Hours			
		Arrive	**Depart**	**Transit Duration**	**Port Time**	**Link Duration**	**Cumulative Duration**
Kodiak	**1**		0000 hrs			0.0 hrs	0.0 hrs
Chignik	**1**	1836 hrs	1936 hrs	18.6 hrs	1.0 hrs	19.6 hrs	19.6 hrs
Sand Point	**2**	0451 hrs	0551 hrs	9.25 hrs	1.0 hrs	10.25 hrs	29.85 hrs
King Cove	**2**	1221 hrs	1321 hrs	6.5 hrs	1.0 hrs	7.5 hrs	37.35 hrs
False Pass	**2**	1651 hrs	1751 hrs	3.5 hrs	1.0 hrs	4.5 hrs	41.85 hrs
Akutan	**2**	0321 hrs	0421 hrs	9.5 hrs	1.0 hrs	10.5 hrs	52.35 hrs
Unalaska	**2**	0751 hrs	1309 hrs	3.5 hrs	5.3 hrs	8.8 hrs	61.15 hrs
Akutan	**2**	1639 hrs	1739 hrs	3.5 hrs	1.0 hrs	4.5 hrs	65.65 hrs
False Pass	**4**	0309 hrs	0409 hrs	9.5 hrs	1.0 hrs	10.5 hrs	76.15 hrs
King Cove	**4**	0739 hrs	0839 hrs	3.5 hrs	1.0 hrs	4.5 hrs	80.65 hrs
Sand Point	**4**	1509 hrs	1609 hrs	6.5 hrs	1.0 hrs	7.5 hrs	88.15 hrs
Chignik	**5**	0124 hrs	0224 hrs	9.25 hrs	1.0 hrs	10.25 hrs	98.4 hrs
Kodiak	**5**	2100 hrs	0000 hrs	18.6 hrs	3.0 hrs	21.6 hrs	120.0 hrs

Table 40
Summary of Model 28-Day Schedule, Option A

		Port Calls			
		Homer to		Aleutians	
Trip Cycle	**Duration**	**Kodiak**	**Port Lions**	**Westbound**	**Eastbound**
Kodiak #1	60 hrs	1	1		
Kodiak #2	48 hrs	2			
Aleutians	120 hrs			1	1
Kodiak #1	60 hrs	1	1		
Kodiak #2	48 hrs	2			
Aleutians	120 hrs			1	1
Kodiak #1	60 hrs	1	1		
Kodiak #2	48 hrs	2			
Kodiak #2	48 hrs	2			
Kodiak #1	60 hrs	1	1		
Total	**672 hrs**	**12**	**4**	**2**	2

The advantage of the 28-day schedule is that it may be repeated, with the day-of-the-week and time of port calls repeating themselves. If this schedule is repeated 11 times during the year, a 44-week service year (typical of AMHS mainline vessels and historical *Tustumena*) is accomplished. In that 44-week service year the *Tustumena* would provide port calls as summarized in Table 41, with the historical number of port calls shown in the table's last row.

Table 41
Summary of 44-Week Service Year
(11 Repetitions of Model 28-Day Schedule)

	Port Calls			
	Kenai Peninsula to		Aleutians	
	Kodiak	**Port Lions**	**Westbound**	**Eastbound**
Dedicated *Tustumena*	132	44	22	22
Historical (1997) *Tustumena*	72	36	7	7

Compared to the 1997 historical schedule, this model schedule triples service to the Aleutians and substantially increases service to Kodiak and Port Lions. Not considered here are the two additional 28-day trip cycles that presumably would be accomplished by the *Kennicott* in her secondary role as the stand-in vessel for the *Tustumena* during the *Tustumena's* annual maintenance period. Those additional 28-day cycles would bring the total number of annual

trips to the southern Alaska Peninsula and Aleutians to 26, a 271% increase in annual service to this sub-region.

It must be noted that much of the increase in service to the southern Alaska Peninsula and Aleutians will be provided during the winter months. A period in which this region currently receives no AMHS service. Wind and sea conditions can be severe in this region during the winter months, which may dampen demand for service during this period. On the other hand, AMHS service during this period may be more reliable than air travel, at least to some locations. Furthermore, some of the fisheries that are important to the economy of this sub-region are winter fisheries. Providing AMHS service to this sub-region may provide needed alternatives for the movement of personnel and freight in support of these winter fisheries.

COSTS: OPTION A (TWO TRIPS TO ALEUTIANS PER FOUR WEEK CYCLE)

According to data contained in a "Vessel Cost/Week FY 96-98" Excel spreadsheet provided by AMHS the average (average of 1997 and 1998) annual operating cost for the *Tustumena* is $7,370,000 ($165,900 per operating week) based on an average of 44.45 weeks of operation per year.[10] Additionally, the *Tustumena* incurred an average of $339,000 in overhaul/project costs.

In Table 42 the total (total includes both operating costs and overhaul/project costs) current annual operating costs for the *Tustumena* are distributed by vessel miles and also by total operating hours, as set forth in Table 42.

Table 42
Distribution of Total Annual Operating Cost
for Current *Tustumena* Operations (44-Week Service Year)

	Pro-rated by Vessel Miles	**Pro-rated by Operating Hours**
Prince William Sound	$1,975,000	$2,118,000
Kodiak-Kenai Pen.	$4,569,000	$4,517,000
Alaska Pen. & Aleutians	$1,165,000	$1,074,000
Total (Annual)	**$7,709,000**	**$7,709,000**

Current annual cost of *Tustumena* operations serving Prince William Sound are equal to or less than $2.118 million (Table 42). Depending on the accounting perspective the additional charge to Southwest Region operations if the *Tustumena* were dedicated exclusively to Southwest service would be between $1.975 million and $2.118 million.

[10] Spreadsheet "Vslopcst.xls" with footer date annotation "pd-10/15/98" and "Fy98_vsl.xls" prepared by B. Braley and printed 10/15/98.

Capital Improvements

The *Alaska Marine Highway System Vessel Refurbishment and Fleet Replacement Study*, prepared by The Glosten Associates, Inc. for Parsons Brinckerhoff, October 1998, identifies the schedule of capital improvements to the *Tustumena* over the next 20 years shown in Table 43.

Table 43
Capital Improvements Schedule for *Tustumena*
(1999 Dollars)

Year	Cost of Scheduled Capital Improvement
2001	$600,000
2002	$0
2003	$4,400,000
2004	$250,000
2005	$1,110,000
2006	$3,684,000
2007	$300,000
2008	$0
2009	$360,000
2010	$300,000
2011	$14,400,000
2012	$8,592,000
2013	$0
2014	$2,580,000
2015	$300,000
2016	$0
2017	$0
2018	$300,000
2019	$0
2020	$1,800,000
Total	**$39,016,000**

Using a discount rate of *i*=7% the present (1999) value of this capital improvement schedule is $19,107,000, and the uniform equivalent annual capital cost over each of the 20 years is $1,930,000 per year.

As the exclusive dedication of the *Tustumena* to Southwest service presumably must be preceded by introduction of new vessels into Prince William Sound service, a pro-rated portion of the capital expenditures in the early years of the schedule given in Table should be charged to Prince William Sound. Assuming that the new Prince William Sound vessels do not enter service until 2005, then approximately 25% of the $5,250,000 capital expenditures between 2001–2004 inclusively, could be charged to Prince William Sound.

Annual Cost by Link

Table 44 presents the annual cost of dedicated *Tustumena* service by link, apportioned to each link according to annual vessel link miles.

Table 44
Dedicated *Tustumena* Service-Annual Cost by Link
Option A

Dedicated Southwest Service				
	Trips	Link Length (n.m.)	Vessel Miles	Cost
Homer-Kodiak	132	136	17,952	$1,672,485
Homer-Port Lions	44	134	5,896	$549,297
Kodiak-Homer	132	136	17,952	$1,672,485
Kodiak-Port Lions	44	48	2,112	$196,763
Port Lions-Homer	44	134	5,896	$549,297
Port Lions-Kodiak	44	48	2,112	$196,763
Kodiak-Chignik	22	249	5,478	$510,354
Chignik-Sand Point	22	138	3,036	$282,847
Sand Point-King Cove	22	98	2,156	$200,862
King Cove-False Pass	22	46	1,012	$94,282
False Pass-Akutan	22	127	2,794	$260,301
Akutan-Unalaska	22	45	990	$92,233
Unalaska-Akutan	22	45	990	$92,233
Akutan-False Pass	22	127	2,794	$260,301
False Pass-King Cove	22	46	1,012	$94,282
King Cove-Sand Point	22	98	2,156	$200,862
Sand Point-Chignik	22	138	3,036	$282,847
Chignik-Kodiak	22	249	5,478	$510,354
Total (44-Week service year)	**704**		**82,852**	**$7,718,848**

The distribution of trips, vessel miles and cost for dedicated *Tustumena* service in Southwest Alaska is given in Table 45.

Table 45
Summary of Dedicated *Tustumena* Service
Option A

	Trips	Vessel Miles	Cost
Homer	352	51,920	$4,837,090
Alaska Pen. & Aleutians	44	30,932	$2,881,758
Total (Annual)	**396**	**82,852**	**$7,718,848**

ESTIMATED DEMAND: OPTION A (TWO TRIPS TO ALEUTIANS PER FOUR WEEK CYCLE)

Assuming 1997 historical levels of passenger and vehicle demand per trip on each link results in the projections of traffic volumes and revenue shown in Table 46. Note that service demand for a dedicated *Tustumena* alternative is estimated differently than for the other marine alternatives described herein. This is because dedication of the *Tustumena*, a vessel already in service, to Southwest Alaska ports already served by the AMHS, represents an adaptation of existing service, rather than a wholly new service concept.

As such, it is possible in the case of this alternative to base forecasts of future service, under changed conditions (e.g., demographics, frequency, and seasonality of service) based on actual past demand levels. In contrast, demand for marine service concepts that are wholly new (e.g., Lake Iliamna–Kvichak River) have had to be based on a statistical models that relies on data from other ports and populations to forecast demand using new types of vessels to communities that have no track record with AMHS service.

Table 46
Dedicated *Tustumena* Service, Option A
Estimated Traffic & Revenue by Link

Dedicated Southwest Service								
	Trips	Cost	Passengers			Vehicles		
			Count	Tariff	Revenue	Count	Tariff	Revenue
Homer-Kodiak	132	$1,672,485	10,857	$48	$694,800	,325	$162	$538,650
Homer-Port Lions	44	$549,297	2,818	$48	$135,264	1,133	$162	$183,546
Kodiak-Homer	132	$1,672,485	10,496	$48	$671,760	2,945	$162	$477,090
Kodiak-Port Lions	44	$196,763	2,304	$20	$46,080	930	$59	$54,870
Port Lions-Homer	44	$549,297	2,326	$48	$111,648	900	$162	$145,800
Port Lions-Kodiak	44	$196,763	2,700	$20	$54,000	1,127	$59	$66,493
Kodiak-Chignik	22	$510,354	1,613	$76	$61,332	638	$272	$173,536
Chignik-Sand Point	22	$282,847	1,258	$42	$26,418	491	$142	$69,722
Sand Point-King Cove	22	$200,862	1,701	$32	$27,232	466	$102	$47,532
King Cove-False Pass	22	$94,282	877	$34	$14,926	368	$111	$40,848
False Pass-Akutan	22	$260,301	1,242	$34	$21,114			
False Pass-Unalaska	22					368	$158	$58,144
Akutan-Unalaska	22	$92,233	1,085	$16	$8,688			
Unalaska-Akutan	22	$92,233	1,085	$16	$8,688			
Unalaska-False Pass	22					368	$158	$58,144
Akutan-False Pass	22	$260,301	877	$34	$14,926			
False Pass-King Cove	22	$94,282	877	$34	$14,926	368	$111	$40,848
King Cove-Sand Point	22	$200,862	1,195	$32	$19,136	547	$102	$55,794
Sand Point-Chignik	22	$282,847	1,066	$42	$22,386	557	$142	$79,094
Chignik-Kodiak	22	$510,354	1,544	$76	$58,672	657	$272	$178,704
Total (44-Week service year)	**704**	**$7,718,848**	**45,921**		**$1,968,550**	**15,188**		**$2,268,815**

Note: No vehicle service to Akutan

This represents an increase in annual passenger and vehicle demand in the service area on the order of the percentages shown in Table 47.

Table 47
Approximate Increase in Service Demand by Service Area Associated with Dedicated *Tustumena* Service, Option A

	Passengers	Vehicles
Kodiak-Kenai Pen.	121%	105%
Alaska Pen. & Aleutians	214%	179%

In "Break-Even Demand on Alternative Ferry Systems in Lynn Canal," February 1999, prepared by Northern Economics, Inc. it was estimated that traffic demand would increase in response to more frequent service. Although a similar demand elasticity analysis has not been performed for Southwest Alaska, the same principles are presumably transferable. Certainly the findings of "Break-Even Demand on Alternative Ferry Systems in Lynn Canal" would tend to support the increases in traffic demand indicated in Table 46 and Table 47.

Total annual revenue could be on the order of $4,237,365, exclusive of on-board sales of staterooms and food. Estimated revenues from stateroom rentals is on the order of $300,000 and onboard food sales are on the order of $100,000. Total annual revenue will therefore be on the order of $4,637,000, which represents approximately 60% of annual operating cost (i.e., implied 40% operating subsidy).

Option B
(One trip to Aleutians per four-week cycle)

Option B's chief distinction from Option A is that Option B would only provide one trip per four week cycle to the Aleutians, rather than two. Table 48 summarizes a model 28-day schedule for Option B.

Guiding Principles for Increased Service

The following are identified for the purposes of this technical memorandum as guiding principles for increased service from the *Tustumena* to the Southwest Alaska region:

- The annual number of trips linking Kodiak to the Kenai Peninsula should not be reduced.
- The annual number of trips linking Port Lions to the Kenai Peninsula should not be reduced.
- The annual number of trips linking Port Lions to Kodiak should not be reduced.
- Trips linking Kodiak (and/or Port Lions) to Homer may be substituted for trips linking Kodiak (and/or Port Lions) to Seward. Each such substitution has the effect of recovering approximately 3.6 hours of transit time (for a one-way transit) due to the shorter distance between Kodiak and Homer as compared to Kodiak to Seward.

- The *Tustumena* currently links Seldovia with Homer. In 1997 the *Tustumena* made 58 trips to Seldovia (*Tustumena* made 73 arrivals at Homer during 1997 from either Kodiak or Port Lions). As a separate aspect of the Southwest Alaska transportation plan a new ferry linking Homer and Williamsport is proposed. That same ferry could also provide service linking Seldovia and Homer with equal or greater frequency of service and capacity when compared to the service currently provided by the *Tustumena*. Accordingly an assumption for the purposes of this technical memorandum is that the *Tustumena* will cease to be the vessel providing ferry service between Seldovia and Homer.
- Currently Akutan is served only one-way (eastbound) by the *Tustumena*. For the purposes of this technical memorandum it shall be assumed that the *Tustumena* will call at Akutan both westbound and eastbound.
- Currently False Pass is served only one-way (westbound) by the *Tustumena*. For the purposes of this technical memorandum it shall be assumed that the *Tustumena* will call at False Pass both westbound and eastbound.
- Studies are currently underway and substantial Federal funding has been provided for a surface transportation link between King Cove and Cold Bay. The new link, when completed, will presumably be either an all road link or a combination of some new road and a ferry operating on the waters of Cold Bay (perhaps operating from Lenard Harbor). Once this surface link is in place it is thought to be unnecessary for the *Tustumena* to call at both King Cove and Cold Bay. Accordingly for the purposes of this technical memorandum it is assumed that the *Tustumena* will call only at King Cove.

Table 48
Summary of Model 28-Day Schedule, Option B

		Port Calls			
		Homer to		Aleutians	
Trip Cycle	**Duration**	**Kodiak**	**Port Lions**	**Westbound**	**Eastbound**
Kodiak #1	60 hrs	1	1		
Kodiak #2	48 hrs	2			
Aleutians	120 hrs			1	1
Kodiak #1	60 hrs	1	1		
Kodiak #2	48 hrs	2			
Kodiak #1	60 hrs	1	1		
Kodiak #2	48 hrs	2			
Kodiak #2	48 hrs	2			
Kodiak #2	48 hrs	2			
Kodiak #2	48 hrs	2			
Kodiak #1	60 hrs	1	1		
Slack Time	24 hrs				
	672 hrs	16	4	1	1

The advantage of the 28-day schedule is that it may be repeated and the day-of-the-week and time of port calls will repeat themselves on a 28-day cycle. If this 28-day schedule is repeated eleven times during the year a 44-week service year (typical of AMHS mainline vessels and historical *Tustumena*) will be accomplished. In that 44-week service year the *Tustumena* would provide port calls as summarized in Table 49. The historical number of port calls is shown in the last row of Table 49 for comparison.

Table 49
Summary of 44-Week Service Year, Option B
(11 Repetitions of Model 28-Day Schedule)

	Port Calls			
	Kenai Peninsula to		Aleutians	
	Kodiak	**Port Lions**	**Westbound**	**Eastbound**
Dedicated *Tustumena*	176	44	11	11
Historical (1997) *Tustumena*	72	36	7	7

Compared to the 1997 historical schedule this model schedule more than doubles service to Kodiak, and substantially increases service to Port Lions, and the Aleutians. Not considered here are the two additional 28-day trip cycles that presumably would be accomplished by the *Kennicott* in her secondary role as the stand-in vessel for the *Tustumena* during the *Tustumena's* annual maintenance period. Those additional 28-day cycles would bring the total number of annual trips to the southern Alaska Peninsula and Aleutians to 13, an 85% increase in annual service to this sub-region.

It must be noted that much of the increase in service to the southern Alaska Peninsula and Aleutians will be provided during the winter, during which this region currently receives no AMHS service. Wind and sea conditions can be severe in this region during the winter, which may dampen service demand at this time. On the other hand, AMHS service during this period may be more reliable than air travel, at least to some locations. Furthermore, some of the fisheries that are important to the economy of this sub-region are winter fisheries. Providing AMHS service to this sub-region may provide needed alternatives for the movement of personnel and freight in support of these winter fisheries.

COSTS: OPTION B (ONE TRIP TO ALEUTIANS PER FOUR-WEEK CYCLE)

According to data contained in a "Vessel Cost/Week FY 96-98" Excel spreadsheet[11] provided by AMHS the average (average of 1997 and 1998) annual operating cost for the *Tustumena* is $7,370,000 ($165,900 per operating week) based on an average of 44.45 weeks of operation per year. Additionally, the *Tustumena* incurred an average of $339,000 in overhaul/project costs.

In Table 50, the total (total includes both operating costs and overhaul/project costs) current annual operating costs for the *Tustumena* are distributed by vessel miles and also by total operating hours:

Table 50
Distribution of Total Annual Operating Cost
for Current *Tustumena* Operations (44-Week Service Year)

	Pro-rated by Vessel Miles	**Pro-rated by Operating Hours**
Prince William Sound	$1,975,000	$2,118,000
Kodiak-Kenai Pen.	$4,569,000	$4,517,000
Alaska Pen. & Aleutians	$1,165,000	$1,074,000
TOTAL (Annual)	**$7,709,000**	**$7,709,000**

Current annual costs associated with operating the *Tustumena* in Prince William Sound are equal to or less than $2.118 million as shown in Table 50. Depending on the accounting perspective, the additional charge to Southwest Region operations if the *Tustumena* were

[11] Spreadsheet "Vslopcst.xls" with footer date annotation "pd-10/15/98" and "Fy98_vsl.xls" prepared by B. Braley and printed 10/15/98.

dedicated exclusively to Southwest service would be between $1.975 million and $2.118 million.

Capital Improvements

The "Alaska Marine Highway System Vessel Refurbishment and Fleet Replacement Study," prepared by The Glosten Associates, Inc. for Parsons Brinckerhoff (October 1998), identifies the following schedule of capital improvements to the *Tustumena* over the next 20 years. These improvements and their projected costs are summarized in Table 51.

Table 51
Capital Improvements Schedule for *Tustumena*
(1999 Dollars)

YEAR	Cost of Scheduled Capital Improvement
2001	$600,000
2002	$0
2003	$4,400,000
2004	$250,000
2005	$1,110,000
2006	$3,684,000
2007	$300,000
2008	$0
2009	$360,000
2010	$300,000
2011	$14,400,000
2012	$8,592,000
2013	$0
2014	$2,580,000
2015	$300,000
2016	$0
2017	$0
2018	$300,000
2019	$0
2020	$1,800,000
TOTAL	**$39,016,000**

Using a discount rate of *i*=7% the present (1999) value of this capital improvement schedule is $19,107,000 and the uniform equivalent annual capital cost over each of the 20-Years is $1,930,000 per year.

As the exclusive dedication of the *Tustumena* to Southwest service presumably must be preceded by introduction of new vessels into Prince William Sound service, a pro-rated portion of the capital expenditures in the early years of the schedule given in Table 51 should be charged to Prince William Sound. Assuming that the new Prince William Sound vessels do not enter service until 2005, then approximately 25% of the $5,250,000 capital expenditures between 2001-2004 inclusively, could be charged to Prince William Sound.

Annual Cost by Link

Table 52 presents the annual cost of dedicated *Tustumena* service by link, apportioned to each link according to annual vessel link miles.

Table 52
Dedicated *Tustumena* Service-Annual Cost by Link
Option B

Dedicated Southwest Service				
	Trips	Link Length (n.m.)	Vessel Miles	Cost
Homer-Kodiak	176	136	23,936	$2,327,726
Homer-Port Lions	44	134	5,896	$573,374
Kodiak-Homer	176	136	23,936	$2,327,726
Kodiak-Port Lions	44	48	2,112	$205,388
Port Lions-Homer	44	134	5,896	$573,374
Port Lions-Kodiak	44	48	2,112	$205,388
Kodiak-Chignik	11	249	2,739	$266,362
Chignik-Sand Point	11	138	1,518	$147,622
Sand Point-King Cove	11	98	1,078	$104,833
King Cove-False Pass	11	46	506	$49,207
False Pass-Akutan	11	127	1,397	$135,855
Akutan-Unalaska	11	45	495	$48,138
Unalaska-Akutan	11	45	495	$48,138
Akutan-False Pass	11	127	1,397	$135,855
False Pass-King Cove	11	46	506	$49,207
False Pass-King Cove	11	98	1,078	$104,833
King Cove-Sand Point	11	138	1,518	$147,622
Chignik-Kodiak	11	249	2,739	$266,362
Total (44-Week service year)	**660**		**79,354**	**$7,717,010**

The distribution of trips, vessel miles and cost for dedicated *Tustumena* service in Southwest Alaska is given in Table 53.

Table 53
Summary of Dedicated *Tustumena* Service, Option B

	Trips	Vessel Miles	Cost
Homer	440	63,888	$6,212,974
Alaska Pen. & Aleutians	22	15,466	$1,504,036
TOTAL (Annual)	**462**	**79,354**	**$7,717,010**

ESTIMATED DEMAND: OPTION B (ONE TRIP TO ALEUTIANS PER FOUR WEEK CYCLE)

Assuming 1997 historical levels of passenger and vehicle demand per trip on each link results in the projections of traffic volumes and revenue shown in Table 54. In "Break-Even Demand on Alternative Ferry Systems in Lynn Canal," February 1999, prepared by Northern Economics, Inc., it was determined that traffic demand will increase in response to more frequent service. Although a similar demand elasticity analysis has not been performed for Southwest Alaska, the principles are presumably transferable. Certainly the findings of "Break-Even Demand on Alternative Ferry Systems in Lynn Canal" would tend to support the increases in traffic demand indicated in Table 54 and Table 55.

Table 54
Dedicated *Tustumena* Service
Estimated Traffic & Revenue by Link, Option B

Dedicated Southwest Service								
		Costs	**Passengers**			**Vehicles**		
	Trips		**Count**	**Tariff**	**Revenue**	**Count**	**Tariff**	**Revenue**
Homer-Kodiak	176	$2,327,726	14,475	$48	$694,800	4434	$162	$718,308
Homer-Port Lions	44	$573,374	2,818	$48	$135,264	1133	$162	$183,546
Kodiak-Homer	176	$2,327,726	13,995	$48	$671,760	3,927	$162	$636,174
Kodiak-Port Lions	44	$205,388	2,304	$20	$46,080	930	$59	$54,870
Port Lions-Homer	44	$573,374	2,326	$48	$111,648	900	$162	$145,800
Port Lions-Kodiak	44	$205,388	2,700	$20	$54,000	1,127	$59	$66,493
Kodiak-Chignik	11	$266,362	807	$76	$61,332	319	$272	$86,768
Chignik-Sand Point	11	$147,622	629	$42	$26,418	246	$142	$34,932
Sand Point-King Cove	11	$104,833	851	$32	$27,232	233	$102	$23,766
King Cove-False Pass	11	$49,207	439	$34	$14,926	184	$111	$20,424
False Pass-Akutan	11	$135,855	621	$34	$21,114			
False Pass-Unalaska	11					184	$158	$29,072
Akutan-Unalaska	11	$48,138	543	$16	$8,688			
Unalaska-Akutan	11	$48,138	543	$16	$8,688			
Unalaska-False Pass	11					184	$158	$29,072
Akutan-False Pass	11	$135,855	439	$34	$14,926			
False Pass-King Cove	11	$49,207	439	$34	$14,926	184	$111	$20,424
King Cove-Sand Point	11	$104,833	598	$32	$19,136	274	$102	$27,948
Sand Point-Chignik	11	$147,622	533	$42	$22,386	279	$142	$39,618
Chignik-Kodiak	11	$266,362	772	$76	$58,672	329	$272	$89,488
Total (44-Week service year)	**660**	**$7,717,010**	**45,832**		**$2,011,996**	**14,867**		**$2,206,703**

Note: No vehicle service to Akutan.

Total annual revenue could be on the order of $4,218,699 exclusive of on-board sales of staterooms and food. Estimated revenues from stateroom rentals is on the order of $300,000 and onboard food sales are on the order of $100,000. Total annual revenue would therefore be on the order of $4,619,000, which represents approximately 60% of annual operating costs (i.e., implying a 0% operating subsidy).

Table 55
Approximate Increase in Service Demand by Service Area
Associated with Dedicated *Tustumena* Service, Option B

	Passengers	**Vehicles**
Kodiak-Kenai Pen.	171%	146%
Alaska Pen. & Aleutians	57%	40%

4. ALASKA PENINSULA ROADWAY (NORTHERN PORTION)

This alternative would provide an overland route extending southwest from Naknek, along the Alaska Peninsula's northern coast to its southern terminus at Port Heiden. In so doing, it would bridge the Naknek River, connecting the communities of Naknek and South Naknek, then pass through Egegik, spur east to Ugashik, and proceed south again through Pilot Point, finally reaching Port Heiden. A separate roadway alternative that would link Port Heiden south through Ivanof Bay is packaged separately, as the Alaska Peninsula Roadway (Southern Portion) Alternative.

Among the transportation infrastructure improvements recently advocated as a means of improving Bristol Bay and Lake and Pen Borough's economic development are roadway links contained in this alternative.[12] According to a report prepared for the Bristol Bay and Lake and Peninsula boroughs by Northern Economics, the relative lack of transportation infrastructure among the communities of this region limits economic development in several ways:

- It contributes to "diseconomies" of scale, wherein every village must maintain its own airport, school, and other public facilities. "Diseconomies of scale are also a primary factor influencing the inadequate public landfills, water and sewer systems that are endemic in the study area" (p. 1-8).
- The lack of transportation infrastructure results in high passenger and freight transportation costs, which in turn, increase the cost of doing business in the region. For instance, the study cites research by the Alaska Industrial Development and Export Authority and Cominco, Ltd., which showed that "poor transportation infrastructure can more than triple the cost of fuel delivery."
- High transportation costs (and infrequent, and/or inconvenient service) have a direct impact on the region's ability to develop its tourism potential, among the region's strongest prospects for economic diversification.
- The lack of transportation infrastructure has an adverse impact on the region's ability to organize and advocate on its own behalf for additional support and resources. As this report notes, "The fact that communities are physically isolated from one another makes it difficult to create a sense or regionalism, in turn hampering development potential. The seemingly simple act of conducting board meetings of either borough means that one or more board member will have to travel to the meeting by plane. …Without a strong sense of region, communities often compete against one another in the political arena, and are often unable to generate support for projects that would benefit the region as a whole." (p. 1-9)

While the roadway links proposed in this alternative and the one following would address the lack of transportation infrastructure in this region, it is critical to bear in several points in mind:

- The capital and M&O costs associated with these alternatives are extremely high – particularly compared to both existing and forecast population served.

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[12] "Economic Recovery Plan for the Lake and Peninsula and Bristol Bay Boroughs," prepared for the Lake and Peninsula Borough and Bristol Bay Borough, by Northern Economics in association with KEA Environmental, Inc. and HDR Alaska, Inc. June 1999.

- Construction of most, if not all, of these alternative would have would have significant adverse impacts on the region's economic mainstay – the salmon harvest.
- Academics have long debated the exact nature of the relationship between transportation infrastructure and economic development. Consensus on this relationship is anything but well understood, particularly in the context of Southwest Alaska, an area with unique challenges, including very low population, rough terrain and extreme winter weather.

Although the prospects of implementing either this or the following alternative at any time in the short-term are remote, initial planning was carried out (1) to determine what a well developed, intermodally integrated transportation plan would entail, in terms of engineering, environmental, and cost issues; and (2) to provide a basis upon which local governments can build in their effort to develop such a system. To develop this alternative, five separate roadway projects were explored. The location of the detailed analysis pertaining to each link is provided in Appendix B.

Table 56
Link Elements of the Alaska Peninsula North Roadway Alternative

- South Naknek to Naknek
- King Salmon to Egegik
- Egegik to Pilot Point
- Pilot Point to Ugashik
- Pilot Point to Port Heiden

Element 1. South Naknek to Naknek Roadway Link

While the 15.5-mile long, well maintained King Salmon-Naknek Road provides an important connection between these communities, the road stops short of crossing the Naknek River to South Naknek, a predominantly Alaskan Native community. Connecting South Naknek to the road system would provide its residents much easier and safer access to the regional airport and other services in the hub community of King Salmon. For instance, South Naknek's children, who are currently flown across the river to school, would benefit from a safer, more reliable mode of school transport. The yearly costs of this service (two planes, two times daily) are estimated at $61,000, which is self-funded by the school district. Two alternatives for linking the communities have been suggested: (1) an aerial tramway; and (2) a bridge (Table 57). A bridge is thought to be the more feasible and cost-effective option given the high and constant M&O costs associated with tram operations.

Table 57
Naknek Area Needs List Entries

Project Name	Description	Estimated Cost	Program	Priority
Naknek River Aerial Tramway	Construct aerial tramway between Naknek and South Naknek over the Naknek River.	4,000,000	CTP	2
Naknek River Bridge	Construct a Bridge between Naknek and South Naknek		CTP	3

Naknek has developed into a major center for the Bristol Bay commercial sockeye salmon fishery. In fact, during the summer, the population swells to about 5,000 – most of whom are fishermen and cannery processor workers who arrive via the airport in King Salmon and travel the road to access canneries in Naknek. The road, which is maintained year-round, is also used to transport millions of pounds of salmon to King Salmon, where the fish are flown out.

This project would build a bridge spanning the Naknek River just east of Horseshoe Bend and Chimenchun Creek. Each of the bridge's two lanes would be nine feet wide with two-foot shoulders. Short roadway links would have to be built to connect the proposed bridge to Naknek and South Naknek.

Although the bridge construction itself would present no obvious problems, permitting would be a major issue given the importance of fishing in the area and the likely construction impacts. Snow plowing would be necessary to keep the road passable in

Capital costs for this project have been estimated at $8,003,000 for a paved surface and $7,640,000 for a gravel surface. Annual M&O costs have been estimated at $29,700 and $33,000, respectively.

Demand for this roadway link is estimated at 109,200 person trips per year as an independent project and 117,300 person trips per year as a component of the alternative (Table 59).

Element 2. King Salmon to Egegik Roadway Link

Constructing the proposed road between Egegik and King Salmon would be essential in linking Egegik and communities to its south along the Alaska Peninsula to the regional hub of King Salmon. This link would provide important freight movement benefits to Egegik, whose residents rely on commercial fishing as a primary income source. This link would make it possible to transport fresh fish by road to the airport at King Salmon for timely distribution.

This project would entail construction of roughly 65 miles of roadway and bridges over the Egegik and Salmon Rivers. The construction would begin out of Egegik heading east along the Egegik River approximately 7 miles. This would allow the bridging of the Egegik River to occur at a point where the river has necked down. A two-lane bridge with nine-foot lanes and two-foot shoulders approximately a third of a mile long would be built to connect the north and south shores of the Egegik River.

On reaching the north shore of the Egegik River, the route would proceed about four miles northwest to the east shore of the King Salmon River. A bridge, approximately 500 feet long,

would be constructed connecting the east and west shores of the King Salmon River. The route would then lead along the west shore of the King Salmon River through the cannery and along the setnet sites of north Egegik to Coffee Point. From this location, the road would follow the Winter Trail northwest along the coast of Bristol Bay. The roadway would require crossing Bishop Creek and Big Creek travelling north along the coast. After passing Abe Peak and Cape Chichagof, the road would lead northeast, still following the coastline. The route would lead west of Johnston Hill and into the south side of South Naknek. To be fully utilized, the bridge from South Naknek across the Naknek River to the Peninsula Highway would have to be built (described earlier). Once across the Naknek River, the existing Peninsula Highway would be used to complete the journey into King Salmon.

Major issues in this element of the alternative are the bridges across the Egegik and Salmon Rivers. Materials for these proposed structures would have to be barged in via the Egegik River, and staging landings would need to be developed. Given the increase of traffic and development of structures that may affect fishing, permitting could be complex. Additionally, the trail along the coast would require monitoring for tide fluctuation; erosion could in fact affect the planned route. Total precipitation is 20 inches annually, including 45 inches of snowfall, making snow removal a primary maintenance cost.

Capital costs for a paved surface on this link are estimated at $97,725,00 and $87,000,000 for a gravel surface. Annual M&O costs are estimated at $$877,500 and $975,000, respectively.

Demand for this roadway link is estimated at 36,000 person trips per year as an independent project and 75,900 person trips per year as a component of the alternative (Table 59).

Element 3. Egegik to Pilot Point Roadway Link

In addition to its function as a link in a proposed Peninsula Highway network, this roadway would help provide connect communities on the peninsula with regional ferry service in Bristol Bay (proposed as a separate alternative in this document). As such, Egegik could serve as an intermodal connector, linking Alaska Peninsula communities with Bristol Bay communities including Dillingham and Togiak. No known trail or road currently connects these communities, which are separated by coastal lowlands dotted with many small ponds, lakes, streams, and rivers, which meander from the mountains of the Aleutian Range into Bristol Bay.

This project would construct roughly 55 miles of roadway between Egegik and Pilot Point. Like all of the other roadway links proposed in this planning effort, the road would have two 9-foot lanes with 2-foot shoulders. From Pilot Point, the road would run northeast, at an elevation near 100 feet to avoid wetlands wherever possible. The road would skirt to the west of Babe Peak and Pike Lake. After passing Pike Lake, the route would proceed west of Rusty Peak, traveling toward the east, avoiding coastal wetlands to the extent feasible. Traveling along the base of the hills, the route would lead to the north, approximately ten miles west of Becharof Lake. After passing west of Swampy Peak, the road would lead back to the west to a crossing of Swampy River. Once past Swampy River the road would travel north of Ege Peak and connect into Chief Hill Road near Egegik.

Roadway construction for this link would be complex given its length and wetlands impacts. The road would follow along the base of the rolling hills traveling through as much upland area as possible. Numerous stream crossings would be necessary. Maintenance considerations of the road are also significant considering the climate and length of the road. Culverts would

require regular clearing, and the road would require regular plowing. Pilot Point receives an average of 38 inches of snowfall annually, while Egegik receives 45 inches per year.

Capital costs for a paved surface on this link are estimated at $74,802,000, while capital costs for a gravel surface are estimated at $65,760,000. Annual M&O costs are estimated at $739,800 and $822,000, respectively.

Demand for this roadway link is estimated at 20,700 person trips per year as an independent project and 60,600 person trips per year as a component of the alternative (Table 59).

Element 4. Pilot Point to Ugashik Roadway Link

MAKING REGIONAL LINKS

Pilot Point and Ugashik are located about 12 miles apart on the north side of the Alaska Peninsula. While Ugashik's permanent population is small (2020 forecast = 4), the area supports an important salmon fishery combined with fish processing. No known road or trail connects these communities. Separated by bodies of water and streams, the main source of transportation is aircraft or boat.

This project would construct roughly 11.8 miles of roadway to connect Pilot Point and Ugashik by bridging the Ugashik River. A proposed landfill located northeast of Pilot Point could form the starting point for the roadway to Ugashik. The road would then travel northeast from Pilot Point toward Pike Lake. Once around the wetlands to the south of the lake, the road would travel southeast toward the Ugashik River, ultimately spanning it to reach the community of Ugashik.

Construction along this roadway link would entail typical fill techniques. Most of this project's capital cost would go toward bridging the Ugashik River. Low cloud cover and fog frequently limit travel and would have to be considered in the safety requirements for the road. Precipitation averages 19 inches per year, with 38 inches of snowfall; as such, plowing would be required to keep the road passable.

Demand for this roadway link is estimated at 4,400 person trips per year as an independent project and 5,600 person trips per year as a component of the alternative (Table 59).

Element 5. Pilot Point to Port Heiden Roadway Link

Pilot Point and Port Heiden are located on the north shore of the Alaska Peninsula. A road between the communities would provide Pilot Point, whose airport is among the region's least sufficient, with access to Port Heiden's 6,250-foot long runway.

This project would construct roughly 87 miles of roadway to connect the ports of Pilot Point and Port Heiden, making this the longest single link proposed in this planning effort. The two-lane road would run northeast from Port Heiden along the north side of the Aleutian Range. The road would have to cross several bodies of water, including Cinder River, Pumice Creek, and Old Creek. The road would then travel into the wetlands of the King Salmon River, running close to the base of the mountains along the higher ground. After crossing the King Salmon River, the route would lead north across several more creeks, finally crossing the Dog Salmon River. The road would then proceed northwest into the south side of the village of Ugashik.

From Ugashik, the road would cross the Ugashik River and head west into Pilot Point as a separate link.

Building a road from Port Heiden to Pilot Point would be complex considering long distance and difficult terrain involved. The road would follow the base of the Aleutian Range, traveling through as much upland area as possible. The majority of the road would be typical fill construction that would require importation or borrowing of large quantities of embankment. Crossing the Ugashik River and numerous other streams would be necessary.

Maintenance considerations are significant given the area's climate and the road's length. Pilot Point's precipitation average is 19 inches per year, with 38 inches of snowfall. Port Heiden averages 58 inches of snowfall per year.

Capital costs for a paved surface are estimated at $119,847,000, while a gravel surface would run to $105,360,000. Annual M&O costs are estimated at $1,185,300 and $1,317,000, respectively.

Demand for this roadway link is estimated at 15,800 person trips per year as an independent project and 34,400 person trips per year as a component of the alternative (Table 59).

Table 58
Overall Cost Summary
Alaska Peninsula Roadway Alternative
(Northern Portion)

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized Capital plus O&M Costs
Roadway Alternatives				
South Naknek-Naknek				
Paved	$29,700	$8,003,000	$755,427	$785,127
Unpaved	$33,000	$7,640,000	$721,162	$754,162
King Salmon to Egegik				
Paved	$877,500	$97,725,000	$9,224,549	$10,102,049
Unpaved	$975,000	$87,000,000	$8,212,185	$9,187,185
Egegik to Pilot Point				
Paved	$739,800	$74,802,000	$7,060,780	$7,800,580
Unpaved	$822,000	$65,760,000	$6,207,279	$7,029,279
Pilot Point to Port Heiden				
Paved	$1,185,300	$119,847,000	$11,312,709	$12,498,009
Unpaved	$1,317,000	$105,360,000	$9,945,239	$11,262,239
Pilot Point–Ugashik				
Paved	$159,300	$24,107,000	$2,275,530	$2,434,830
Unpaved	$177,000	$22,160,000	$2,091,747	$2,268,747
TOTAL				
Paved Option	$2,991,600	$324,484,000	$30,628,994	$25,820,024
Unpaved Option	$3,324,000	$287,920,000	$27,177,611	$30,501,611

Table 59
2020 Annual Travel Demand Estimate
Alaska Peninsula Roadway Alternative
(Northern Portion)

	Independent*	Alternative**	System***
Roadway Elements			
South Naknek to Naknek	109,200	117,300	134,300
King Salmon to Egegik	36,000	75,900	118,500
Egegik to Pilot Point	20,700	60,600	103,200
Pilot Point to Ugashik	4,400	5,600	6,400
Pilot Point to Port Heiden	15,800	34,400	77,000

* Demand on the link as an independent element.

** Demand on the link as part of the alternative.

*** Demand on the link assuming implementation of a Cook Inlet to Bristol Bay to Alaska Peninsula roadway system.

Table 60
Driving Distances Between Communities
Linked by Proposed Alaska Peninsula Roadway Alternative
(via Igiugig to King Salmon Option)

	Chigniks	Egegik	Igiugig	Iliamna	Ivanof Bay	King Salmon	Naknek	Nondalton	Pedro Bay	Perryville	Pile Bay	Pilot Point	Port Heiden	S. Naknek	Ugashik	Williamsport
Chigniks	X	204	325	381	50	269	282	397	408	40	419	149	62	284	161	434
Egegik	204	X	121	199	254	65	78	193	204	244	215	55	142	80	67	230
Igiugig	325	121	X	56	375	56	69	72	83	365	94	176	263	71	188	109
Iliamna	381	177	56	X	431	112	127	16	27	421	38	232	319	129	244	53
Ivanof Bay	50	254	375	431	X	319	332	447	458	10	469	199	112	334	211	484
King Salmon	269	65	56	112	319	X	13	128	139	309	150	120	207	15	132	165
Naknek	282	78	69	127	332	13	X	143	152	322	163	133	220	2	145	178
Nondalton	397	193	72	16	447	128	143	X	43	437	54	248	335	145	260	69
Pedro Bay	408	204	83	27	458	139	152	43	X	448	11	259	346	154	271	26
Perryville	40	244	365	421	10	309	322	437	448	X	459	189	102	324	201	474
Pile Bay	419	215	94	38	469	150	163	54	11	459	X	270	357	165	282	15
Pilot Point	149	55	176	232	199	120	133	248	259	189	270	X	87	135	12	285
Port Heiden	62	142	263	319	112	207	220	335	346	102	357	87	X	222	99	372
S. Naknek	284	80	71	129	334	15	2	145	154	324	165	135	222	X	147	180
Ugashik	161	67	188	244	211	132	145	260	271	201	282	12	99	147	X	297
Williamsport	434	230	109	53	484	165	178	69	26	474	15	285	372	180	297	X

Table 61
Driving Distances Between Communities
Linked by Proposed Alaska Peninsula Roadway Alternative
(via Igiugig to Naknek Option)

	Chigniks	Egegik	Igiugig	Iliamna	Ivanof Bay	King Salmon	Levelok	Naknek	Nondalton	Pedro Bay	Perryville	Pile Bay	Pilot Point	Port Heiden	S. Naknek	Ugashik	Williamsport
Chigniks	X	204	357	413	50	269	356	282	429	440	40	451	149	62	284	161	466
Egegik	204	X	153	209	254	65	152	78	225	236	244	247	55	142	80	67	262
Igiugig	357	153	X	56	407	88	39	75	72	83	397	94	208	295	77	220	109
Iliamna	413	209	56	X	463	144	95	131	16	27	453	38	264	351	133	276	53
Ivanof Bay	50	254	407	463	X	319	406	332	479	490	10	501	199	112	334	211	516
King Salmon	269	65	88	144	319	X	87	13	160	171	309	182	120	207	15	132	197
Levelok	356	152	39	95	406	87	X	74	111	122	396	133	207	294	76	219	148
Naknek	282	78	75	131	332	13	74	X	147	158	322	169	133	220	2	145	184
Nondalton	429	225	72	16	479	160	111	147	X	43	469	54	280	367	149	292	69
Pedro Bay	440	236	83	27	490	171	122	158	43	X	480	11	291	371	160	303	26
Perryville	40	244	397	453	10	309	396	322	469	480	X	491	189	102	324	201	506
Pile Bay	451	247	94	38	501	182	133	169	54	11	491	X	302	389	171	314	15
Pilot Point	149	55	208	264	199	120	207	133	280	291	189	302	X	87	135	12	317
Port Heiden	62	142	295	351	112	207	294	220	367	378	102	389	87	X	222	99	404
S. Naknek	284	80	77	133	334	15	76	2	149	160	324	171	135	222	X	147	186
Ugashik	161	67	220	276	211	132	219	145	292	303	201	314	12	99	147	X	329
Williamsport	466	262	109	53	516	197	148	184	69	26	506	15	317	404	186	329	X

5. ALASKA PENINSULA ROADWAY ALTERNATIVE (SOUTHERN PORTION)

Element 1. Port Heiden to Chigniks Roadway Link

The Chigniks and Port Heiden are separated from the Meshik River by the Aleutian Range and wetlands. A roadway connecting these two communities would provide a trans-Peninsula surface route The Peninsula's southern communities would benefit from access to the Port Heiden airport and its 6,250-foot runway. Meanwhile, Port Heiden would have access to the Chigniks, including a deep-water port and Alaska Marine Highway System service. Completing this link could provide significant savings in freight movement costs, as it would provide shippers with a faster, less expensive alternative to shipping goods by sea around the Peninsula through passes many miles to the south.

The project would construct roughly 62 miles of roadway to connect the north and south shores of the Alaska Peninsula. Port Heiden would constitute the northern terminus of the route and the Chigniks its southern terminus. The route would follow an existing trail along the coast of Chignik Lagoon, crossing several creeks before reaching Dry Creek.[13] At Dry Creek, the road would travel up into the mountain valleys past Hook Creek, just west of Portage Pas. From this point, another trail would provide a potential route for the road to cross over the Aleutian Range. Once over the mountains, the road would head northwest, following Violet Creek into the Meshik River wetlands. Once through the Meshik River area, the road would travel north, traversing the lower elevations of the Aniakchak Crater into Port Heiden.

This road would be difficult to build given the long distance across rugged, remote terrain. The Pacific shoreline along the Aleutian Mountains is generally characterized by steep cliffs, offshore spires, and small, rocky islands. The most difficult section of this link would be north of the Aleutian Range. Besides dozens of water crossings, the roadway would be routed through approximately eight miles of the Meshik River wetlands, raising significant permitting issues due to embankment requirements and the need for fish passage in this area. Maintenance, as well as construction, would be a concern, given the proposed road's length and the difficulty of providing logistical support. The area's weather is extreme, with high winds, heavy precipitation, and average annual snowfall of 58". As such, plowing would be required to keep the road passable throughout the year.

Capital costs for this project are estimated at $84,630,000 for a paved surface, and $74,40,000 for gravel. Annual M&O costs are estimated at $837,000 and $930,000, respectively.

Demand for this roadway link is estimated at 24,800 person trips per year (Table 64).

[13] A 45-mile trail starts at Chignik Lagoon and runs northeast along the coast of Chignik Bay and continues to and along Kujulik Bay. The trail turns north at North Fork, then northwest to meet the Aniakchak River beside Pinnacle Mountain. The Alaska Department of Natural Resources has identified the trail as a potential RS2477 route. Residents of Chignik Lagoon have long used this trail to travel north along the Alaska Peninsula. Another trail runs from Hook Bay north and west along Hook Creek over a low pass to Violet Creek in the Meshik River drainage. This trail continues west toward Black Peak.

Element 2. Chignik Bay to Chignik Lagoon to Chignik Lake Roadway Links

The Chigniks form a triangle, with Chignik Lagoon at the apex, Chignik Lake at the left side of the base, and Chignik (Bay) at the right-hand side of the base. Although no roads currently connect these communities, doing so would carry potential economic benefits, including greater access and mobility for these communities' residents and visitors, and cost savings accruing from the possible consolidation of facilities and services. For instance, if this link were developed, rather than operating three separate airports with less than optimal facilities, a new regional airport could be built at Metrofania Creek. Both a roadway system to connect the Chigniks, as well as development of a new regional airport, are explored as elements of this alternative.

No known roads or trails yet link these communities, which are separated by mountains and water. This project would build about 21 miles of new roadway to connect the communities of Chignik, Chignik Lagoon, and Chignik Lake. The proposed route between Chignik and Chignik Lagoon comprises a 12.1-mile stretch of mostly rolling terrain. The route passes through a mountain valley just outside Chignik and continues along the coast of Mallard Duck Bay, and then north around Rocky Point to Chignik Lagoon. The road to Chignik Lake would branch off from this road near Mallard Duck Bay. This road would be approximately 9 miles long, traversing coastal terrain to Chignik Lake. Both roadways would require several culverts for creek crossings.

The roadway segments would likely be built in phases, as funding became available. The 1997 Needs List includes a line item for "Chignik Area Inter-Village Road System Construction," which would "Construct approximately 20 miles of new road to link the communities of Chignik (Bay), Chignik Lagoon, and Chignik Lake. This project received a priority rating of 3, but no cost estimate was provided. In the project nomination package, the cost for the entire project was estimated at $26,000,000. In 1998, the DOT&PF estimate the project cost at $22,800,000 for a single-lane, 14-foot wide roadway with pullouts every 1,000 feet. The $27,120,000 cost estimate arrived at in this planning effort reflects AASHTO standards for a rural major collector; that is, two nine-foot lanes with 2-foot shoulders.

Chignik Bay and the shoreline along the Aleutian Mountains are generally rugged, with steep cliffs, offshore spires, and rocky islands. Precipitation in the area averages 128 inches per year, with 58 inches of snowfall. Cloud cover, heavy winds, and snow levels in winter months could create avalanche hazards.

Capital costs for a paved surface for this roadway link are estimated at $30,849,000, while costs for gravel are estimated at $27,120,000. Annual M&O costs are estimated at $305,100 and $339,000, respectively.

Demand for this roadway link is estimated at 118,000 person trips per year as an independent project and 170,100 person trips per year as a component of the alternative (Table 64).

Element 3. Metrofania Regional Airport

Each of the three Chigniks has its own airport, all of which fall below the community-class standard of a 3,000-foot runway (Table 62). All three are gravel-paved. This project would construct a new, regional airport in the Metrofania Creek Valley to be shared by these

communities (and possibly others, if roadway links between the Chigniks and outside communities to the north and south were also built). The Metrofania Valley, formed by Metrofania Creek, lies approximately 5.5 miles east of Chignik Lake. The proposed airport would have a runway about 4,000 feet long by 100 feet wide, although it must be noted that final runway dimensions could only be established as part of a airport master planning effort, based on the selection of the design aircraft. For the purposes of estimating capital and M&O costs, the runway assumed would be capable of accommodating an aircraft up to the specifications of a DC-3.

Table 62
Current Chigniks Airports Specifications

Community	Airport Name	Class	Length	Width
Chignik	Chignik	Community	2,600'	60'
Chignik Lagoon	Chignik Flats	Community	1,600'	60'
Chignik Lake	Chignik Lake	Community	2,800'	60'

The regional airport would be accessed by the proposed roadway system linking Chignik Lake to Chignik and Chignik Lagoon. The road to the airport would branch off of the Chignik Intervillage roadway near Metrofania Creek. It is assumed that the airport would be built very close to the Intervillage road, in the lower reaches of the valley - as such, only about a quarter-mile of access roadway would be required.

The ability to develop a safe, reliable new airport hinges on the local environment's wind and weather conditions. Accurately aligning the runway with prevailing winds is particularly important. It is difficult to ascertain, given the level of information yet available, whether a site with suitable terrain, airspace, and weather exists in Metrofania Valley. Weather in the lower Peninsula typically includes high winds, fog, rain, and snow - which combined with the rugged terrain surrounding the Metrofania Valley - make render such a site technically or financially infeasible. Weather and topographic difficulties now experienced at the King Cover airport could very well be found within the Metrofania Valley's microclimate. Until more detailed topographic and atmospheric data are available, the ultimate feasibility and cost estimates of a new regional airport in Metrofania Valley remain uncertain. Accordingly, an airport master plan would be required before proceeding any further with this proposal.

In any case, the planning-level capital cost estimate for a new airport at Metrofania Valley, which includes medium-intensity lighting, is $12,000,000. Annual M&O costs are estimated at $30,000.

Passenger volume for this airport, based on the combination of forecast demand for Chignik, Chignik Lake, and Chignik Lagoon, is estimated at 2,037 passengers per year. If the communities of Perryville and Ivanof Bay were also assumed to use this airport (which would require construction of those roadway links with one another and with the airport at Metrofania), then the demand estimated would rise slightly, to 2,330 ("Southwest Alaska Transportation Plan Travel Demand Forecasts Technical Memorandum," May 1998).

Element 4. Chigniks to Perryville Roadway Link

This proposed roadway would connect the Chigniks with Perryville and potentially as far south as Ivanof Bay, if that element of this alternative were also built. In so doing, it would foster regional integration and economic development by allowing the sharing of community resources and services and by allowing intermodal access to the proposed regional airport at Metrofania, and AMHS service, which is currently provided to Chignik. Another alternative in this plan would increase the level of AMHS service to Southwest Alaska, including Chignik.

No known trails or roads currently connect the Chigniks and Perryville. This project would construct a 40.1-mile road beginning at Perryville and running up along the coast of Metrofania Bay to Ivan Bay. Channeling through mountain valleys and a small mountain pass (approximately 1,000 feet), the route would cross numerous streams and rivers just south of Windy Bay, from which point the route would proceed north toward Portage Bay. The road would tie into the Chignik region along Metrofania Creek.

This roadway link presents some of the most significant construction and maintenance challenges of any of the individual or links presented herein. The challenges stem from the area's rugged, mountainous terrain, the proposed road's length, and the necessity of accommodating numerous fish passages. Given the link's location at the base of mountains, avalanche risks would also have to be assessed. This area receives an annual average of 127 inches of precipitation, including 58 inches of snowfall; as such, plowing would be required to keep the road passable throughout the year. Plowing costs are reflected in the M&O estimate.

Capital costs for this project are estimated at $56,166,500 for a paved surface, and $49,550,000 for a gravel surface. Annual M&O costs are estimated at $541,350 and $601,500, accordingly.

Demand for this roadway link is estimated at 23,400 person trips per year as an independent project and 31,100 person trips per year as a component of the alternative (Table 64).

Element 5. Perryville to Ivanof Bay Roadway Link

Perryville, which has a landing strip, and Ivanof Bay, which has a seaplane base, are located roughly 10 miles apart, and are not connected by road or any known trail. Separated by water and mountains, these communities' links within the region and the world beyond, are made by air or by sea. A road connection between them would facilitate pooling of limited public resources including schools, medical care, and the more frequent AMHS service also proposed as part of this transportation plan (if the road link from Perryville to the Chigniks were also built).

This project would result in a ten-mile, two-lane road with 2' shoulders between Perryville and Ivanof Bay. The proposed route would run south along the coast of Ivanof Bay, crossing a small peninsula and through a valley to the Pacific Ocean. The route would then run along the Pacific Coast to Perryville.

Construction of this roadway link is made somewhat challenging by the steep cliffs, offshore spires, and small rocky islands that characterize this portion of the Pacific shoreline and Aleutian Mountains. And, like most of the other roadway projects proposed in this plan, the route would cross many streams and rivers, necessitating accommodation of fish passage.

Finally, many of the area's soils were formed in deposits of volcanic ash and cinder over glacial deposits - such soils are susceptible to erosion. With annual precipitation in the neighborhood of 127 inches, with 58 inches of snowfall, plowing would be required to keep the road passable throughout the year.

Capital costs for this alternative are estimated at $13,650,000 for a paved surface, and at 12,000,000 for a gravel surface. Annual M&O costs are estimated at $135,000 and $150,000, respectively.

Demand for this roadway link is estimated at 14,900 person trips per year as an independent project and 22,600 person trips per year as a component of the alternative (Table 64).

Table 63
Overall Cost Summary
Alaska Peninsula Roadway Alternative
(Southern Portion)

	Annual O&M Cost	Total Capital Cost	Capital Recovery Factor @ 7% Interest	Annualized cap cost plus O&M Cost
Roadway Elements				
Chigniks–Port Heiden				
Paved	$837,000	$84,630,000	$7,988,473	$8,825,473
Unpaved	$930,000	$74,400,000	$7,022,834	$7,952,834
Chignik Bay–Chignik Lagoon–Chignik Lake				
Paved	$305,100	$30,849,000	$2,911,927	$3,217,027
Unpaved	$339,000	$27,120,000	$2,559,936	$2,898,936
Perryville–Chigniks				
Paved	$541,350	$56,166,500	$5,301,720	$5,843,070
Unpaved	$601,500	$49,550,000	$4,677,169	$5,278,669
Ivanof Bay–Perryville				
Paved	$135,000	$13,650,000	$1,288,463	$1,423,463
Unpaved	$150,000	$12,000,000	$1,132,715	$1,282,715
Airport Element				
Metrofania Airport	$30,000	$12,000,000	$1,132,715	$1,162,715
TOTAL				
Paved Option	$1,818,450	$197,295,500	$18,623,299	$20,471,749
Unpaved Option	$2,050,500	$175,070,000	$16,525,370	$18,575,870

Table 64
2020 Annual Travel Demand Estimate
Alaska Peninsula Roadway Alternative
Southern Portion

	Independent*	Alternative**	System***
Roadway Elements			
Port Heiden to Chigniks	24,800	24,800	85,900
Chigniks Intervillage System	118,000	170,100	212,700
Chigniks to Perryville	23,400	31,100	40,800
Perryville to Ivanof Bay	14,900	22,600	29,600

* Demand on the link as an independent element.

** Demand on the link as part of the alternative.

*** Demand on the link assuming implementation of a Cook Inlet to Bristol Bay to Alaska Peninsula roadway system.

6. BRISTOL BAY MARINE SERVICE ALTERNATIVE

One means of providing the far-flung communities of northern Bristol Bay would be to link them by means of new ferry service. This alternative explores the technical feasibility of such service, along with planning-level cost analyses. New ferry service in Bristol Bay has been expressed as a desired objective by the Southwest Alaska Municipal Conference.

The ferry concept proposed herein would serve Togiak, Dillingham, Clarks Point, Naknek, and Egegik directly. Dillingham, with a population of 2,226 (and a 2020 population forecast of 2,749), is the economic, government, transportation and public service center for western Bristol Bay. The rationale for the proposed service is that it would provide the communities of the area another way of reaching one another, and of reaching the regional hub of Dillingham. In improving the area's access and mobility, economic development would be supported. The primary value of providing this missing marine link would be to give surrounding communities more than one mode of transportation to this regional hub.

Given the shallow water at Togiak, Clarks Point, and Dillingham, a shallow-draft landing craft would e the most appropriate vessel type for the service envisioned. The dimensions of such a vessel would consist of an LOA of about 150 feet, a beam of about 47 feet, a hull depth of about 10 feet, and a draft of about 4'0" to 6'. A special feature of the vessel required for such service would include a vehicle elevator/turntable, similar to the one on the *Tustumena*. A service speed of 12 knots would be feasible. Given the vessel's speed, the distances involved, and number of ports served, it would be possible to serve Dillingham three times a week, Clarks Point four times a week, and Togiak, Egegik and Naknek once a week each.

This alternative is limited by two major constraints: (1) winter ice would prevent operations for fully half the year (October 1 through April 30); (2) shallow water at three of the five ports served would require frequent delays of up to six hours. (Such delays are allowed for in the model schedule presented in Table 65).

Seven crew would be required: a master, two mates, two engineers, and two A.B.s. Service frequency is envisioned at once a week to Togiak, Egegik, and Naknek, although Dillingham and Clarks Point would be served several times a week, as reflected in the model schedule (Table 65).

Table 65
Model Schedule
Bristol Bay Marine Link

	Arrival		Departure		Port Time	Sailing Time
	Day	**Time**	**Day**	**Time**	**Duration**	**Duration**
Dillingham			Monday	6:00		1:10
Clarks Point	Monday	7:10	Monday	7:40	0:30	10:40
Togiak	Monday	18:20	Tuesday	6:20	12:00	10:40
Clarks Point	Tuesday	17:00	Tuesday	17:30	0:30	1:10
Dillingham	Tuesday	18:40	Wed.	6:40	12:00	4:00
Clarks Point	Monday	16:57	Monday	17:27	0:30	0:22
Egegik	Wed.	13:20	Thursday	1:20	12:00	4:00
Naknek	Thursday	5:20	Thursday	17:20	12:00	5:50
Clarks Point	Thursday	23:10	Thursday	23:40	0:30	1:10
Dillingham	Friday	0:50				

Capital costs for this alternative are estimated at $3.5 million, and annual M&O costs are estimated at $890,000.

Table 66
Bristol Bay Marine Service
Estimated Vessel Acquisition and Operating Costs

	Minimum	Maximum
Vessel Acquisition Cost	$3,250,000	$3,750,000
Subtotal: (Acquisition Cost)	$3,250,000	$3,750,000
Hull Maintenance	$5,400	$6,600
Machinery Maintenance	$9,100	$11,100
Crew	$283,000	$1,554,000
Fuel	$174,000	$217,000
Lubricating Oil	$2,500	$3,200
Berthing	$8,300	$10,100
Insurance	$100,000	$161,000
Subtotal: (Annual Operating Cost)	$583,000	$1,196,400

Demand for this service link is estimated at 3,902 passenger trips per year, with vehicle demand at 621 vehicles per year.

Table 67
Overall Cost Summary
Bristol Bay Marine Service Alternative

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized Capital plus O&M Costs
Marine Elements				
Bristol Bay Marine Service	$890,000	$3,500,000	$330,375	$1,220,375
TOTAL	$890,000	$3,500,000	$330,375	$1,220,375

Table 68
2020 Annual Travel Demand Estimate
Bristol Bay Marine Service Alternative

	Travel Demand
Marine Elements	
Bristol Bay Marine Service	3,900

7. INTRA-KODIAK ISLAND ALTERNATIVE

One of the sets of missing or underserved transportation was among the communities of Kodiak Island. Consequently, the consultant team explored the technical feasibility of providing such a linkage, along with planning-level cost estimates for such service.

The alternative developed would link Kodiak, a regional hub, with the island's chief outports: Old Harbor, Akhiok, Karluk, Larsen Bay, Port Bailey, Port Lions and Ouzinkie,[14] This linkage would provide residents' of these communities with access a range of intermodal connections (including AMHS service, a major harbor, and a regional-center airport) as well as the many services and goods available in Kodiak. This alternative would also allow residents of these outports to benefit more directly from baseline transportation improvements scheduled for Kodiak (e.g., Pasagshak Road Spot Reconstruction; Rezanof Drive 'Y' Intersection; Selief Lane Reconstruction; and a $7.75 million maintenance, repair, and replacement project at Kodiak Harbor).

Given that state expenditures for M&O have remained static (declining in real terms) over the past several decades, combined with the state's large budget shortfall, it would be unrealistic to imagine that this service could be added to the state's current M&O burden. Rather, ownership, operation and maintenance of such service is presented as a possible course of action for local government. Recent efforts to develop ferry service on Prince of Wales Island provide a model of such an arrangement.

Navigational conditions at four of the six ports to be served by this alternative effectively determine most aspects of this service: the type of vessel required, schedule, and costs. At various points in the exploration of this alternative, service by the *Tustumena* was envisioned. If the *Tustumena* were dedicated to service in Southwest Alaska (as proposed in another alternative), then she might also be able to provide service around Kodiak Island, at least as a pilot or demonstration project to ascertain whether interest and demand justified such service. However, initial investigation revealed that several of the outports of Kodiak Island would not be able to accommodate a vessel of the *Tustumena's* size and deep draft. Potential navigational difficulties at the ports to be served under this alternative are summarized in Table 69.

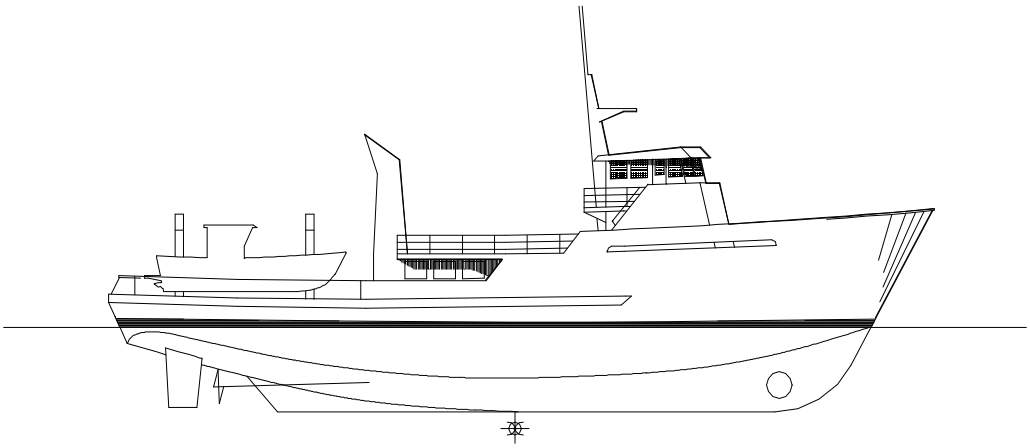
[14] Because Women's Bay and Chiniak are connected by road to Kodiak, these ports have not been included in the exploration of this alternative.

Table 69
Issues in Serving the Outports of Kodiak Island via New Ferry Service

Port	Issues and Comments
Akhiok	Not accessible, except by skiff
Larsen Bay	Difficult approach. Unsuitable for *Tustumena*. Possibly suitable for new 150' x 8' draft vessel
Old Harbor	Inadequate pier and water depth for *Tustumena*; probably serviceable via new 150' x 8' vessel
Ouzinkie	Difficult approaches. Pier facilities possibly suitable for 150' vessel, but definitely inadequate for *Tustumena*.
Karluk	Exposed anchorage. Further evaluation necessary; possible alternative is would be to call at Uyak Anchorage.
Port Bailey	Wharf definitely suitable for a 150' x 8' draft vessel. Water depth at wharf is suitable for *Tustumena*.
Port Lions	Already a port of call for *Tustumena*; port facilities pose no issues for either *Tustumena* or 150' x 8'-draft vessel.

Accordingly, the consultant explored the feasibility of serving these ports with a different vessel type. Given the proposed route's exposed waters and rough seas, any vessel providing passenger service would have to be of substantial length and draft (around 150' with a draft of approximately 8'). However, the proposed route's ports are also characterized by narrow, rocky passages, fog, and shoal-draft ports and harbors, which make it challenging, and in at least one case impossible, to serve these ports via a vessel of these dimensions. A lighter would definitely be required to serve Akhiok, and would probably be required to serve Old Harbor, Karluk, Larsen Bay, and Ouzinkie. The solution proposed to this problem would be to use the 150' x 8' draft vessel, but to also equip it with a lighter, which would be used to access the otherwise unreachable ports. The lighter would be a shoal-draft vessel, between 30 and 40 feet overall. The primary vessel would have to be able to not only carry, but also launch and retrieve the lighter. Depicted in Figure 5 is a sketch of the basis vessel, including the lighter.

Figure 5
Concept Sketch of Kodiak Intra-Borough Ferry with Lighter



SCHEDULE

Assuming port calls at Kodiak, Old Harbor, Akhiok, Karluk, Larsen Bay, Port O'Brien, Port Bailey, and Ouzinkie, the distance around Kodiak Island is 403 nautical miles (n.m.). The 150' x 8' vessel explored for the purposes of developing this alternative would run at a nominal service speed of 11 knots. At 93 n.m., the longest leg in the service would take 8.5 hours, while the shortest leg, between Ouzinkie and Kodiak, would take 2 hours. The model schedule shown in Table 70 allows for slow running when entering and departing ports, and when transiting difficult passages, such as Whale Passage or Afognak Strait. Port times from 1-2 hours are allowed at ports requiring lightering, with the longer port times allocated to Akhiok and Larsen Bay, where longer lighterage runs may be required. By the same token, short, half-hour port times are allocated in Port O'Brien and Port Bailey, where the vessel could moor against a conventional dock. Including time in port, the complete circumnavigation schedule could be accomplished within a 48-hour period Table 70.

Table 70
Model Schedule for Circumnavigation of Kodiak Island

	Day #	2400 hour clock		Decimal Hours			
		Arrive	Depart	Transit Duration	Port Time	Link Duration	Cumulative Duration
Kodiak	**1**		0000 hrs			0.0 hrs	0.0 hrs
Old Harbor	**1**	0830 hrs	0930 hrs	8.50 hrs	1.0 hrs	9.50 hrs	9.50 hrs
Akhiok	**1**	1530 hrs	1730 hrs	6.00 hrs	2.0 hrs	8.00 hrs	17.50 hrs
Karluk	**2**	0015 hrs	0115 hrs	6.75 hrs	1.0 hrs	7.75 hrs	25.25 hrs
Larsen Bay	**2**	0345 hrs	0545 hrs	2.50 hrs	2.0 hrs	4.5 hrs	29.75 hrs
Port O'Brien	**2**	1015 hrs	1045 hrs	4.50 hrs	0.5 hrs	5.0 hrs	34.75 hrs
Port Bailey	**2**	1415 hrs	1445 hrs	3.50 hrs	0.5 hrs	4.00 hrs	38.75 hrs
Ouzinkie	**2**	1900 hrs	2000 hrs	4.25 hrs	1.0 hrs	5.25 hrs	44.00 hrs
Kodiak	**2**	2200 hrs	0000 hrs	2.00 hrs	2.0 hrs	4.0 hrs	48.00 hrs

CREW

Since circumnavigation would exceed 12 hours, two complete watches would be required to crew this proposed service. A single watch would comprise four persons: a watch-standing mate, two able-bodied seamen (A.B.s) and a watch-standing assistant engineer. For a passenger vessel operating in hours of darkness, a patrolman would be required. Given each circumnavigation's 48-hour duration, food service for both crew and passengers would be required. Thus, the total crew for this proposed service would consist of 12: eight watch standers, plus the master, the chief engineer, the watchman, and a cook.

COSTS

Capital costs for this alternative are attributable to vessel acquisition. They are estimated at $3,250,000. M&O costs, which include vessel maintenance; crewing; fuel; insurance; and management, shoreside, and ports and terminal overhead, are estimated at $2,151,325 per annually.

Table 71
Overall Cost Summary
Intra-Kodiak Island Alternative

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized Capital plus O&M Costs
Marine Alternatives				
Intra-Kodiak Island Marine Service	$2,151,325	$3,250,000	$306,777	$2,458,102
TOTAL	$2,151,325	$3,250,000	$306,777	$2,458,102

Table 72
2020 Annual Travel Demand Estimate
Intra-Kodiak Island Alternative

	Travel Demand
Intra-Kodiak Island Marine Service	7,500

SPECIAL CASES

KING COVE TO COLD BAY LINKAGE

DOT&PF has been working on a King Cove-Cold Bay Transportation Improvement Assessment in conjunction with completion of a Southwest Alaska Transportation Plan. As DOT&PF was examining transportation needs in the King Cove and Cold Bay area, Alaska's Congressional delegation took up the issue of improved transportation between the two communities.

While that was happening, DOT&PF completed a draft of a "transportation needs" document and most of the other technical reports listed below. Congress debated a proposal by Alaska Congressmen that would have created a right-of-way for a road through the Izembek Wilderness, with funding for any such road assumed to come through the standard Federal Highway Administration grant to the state. The reason for pursuing the road right-of-way was for a more reliable alternative to the existing air transportation system. A compromise position, developed by Senator Ted Stevens, dropped the proposed right-of-way through the designated Wilderness of Izembek National Wildlife Refuge. Instead, however, federal appropriations bills included $20 million for a road-and-ferry combination that would avoid the designated Wilderness; $15 million for a new or upgraded King Cove airport; and $2.5 million for medical facility upgrades in King Cove. DOT&PF has continued with its own transportation improvement assessment and is now culminating that effort with a Facility Concept Report (FCR). The FCR will summarize findings of the following reports and studies completed as part of this effort:

- Assessment of Transportation Need, Draft, December 1997
- Available Marine Technologies Technical Memorandum, April 1998
- Technical Memorandum: Two Selected Marine Options, May 1998
- Port and Shore Facility Requirements Technical Memorandum, June 1998
- Airport Improvement Options-Aviation Considerations, July 1998
- Roadway Alternatives Technical Memorandum, Draft August 1998
- Telemedicine Issues Relevant to King Cove and Cold Bay, Draft, October 1998.
- Environmental Issues and Environmental Process, January 1999.

Where appropriate, the FCR will reflect the options resulting from the Congressional action. The intent of the FCR is to present factual information on marine, land, and air alternatives-including preliminary cost estimates for construction and for operation and maintenance. The FCR will also present a preliminary statement of purpose and need. The FCR is not intended to compare alternatives, their impacts, or their ability to meet the project's purpose and need.

AKUTAN TO UNALASKA LINK

PenAir currently provides seaplane air service between Akutan and Unalaska. A seaplane base (ramp) is located on the shoreline between the community and the Trident Seafoods

plant. With steep mountainsides, narrow valleys, little flat land, strong variable winds, low clouds, and fog, Akutan does not currently have a land-based airstrip., PenAir currently operates Grumman Goose aircraft along this link. Although the Grumman Widgeon has been used in the past, it is not presently in service.

The Goose can seat up to eight passengers, the Widgeon three to four. The payload flown depends on weather conditions, but for the Goose ranges between 1,500 and 2,000 pounds. In all, PenAir operates four Goose between Dutch Harbor and Kodiak. Only about 350 Goose were ever manufactured, the last new one being built in 1945. Although these aircraft are well suited to local condition, they are now over 50 years old. These planes' remaining life is a concern given their age and the availability of parts.

Floatplanes such as the Cessna 206 and de Havilland Beaver, in addition to having a small passenger capacity, are not designed to handle the swells and choppy seas experienced in Akutan Harbor. Larger floatplanes, such as the Twin Otter, appear to be better able to operate in rougher waters, even though they are on floats. A local pilot reported that an Italian or Swiss manufacturer was developing a monohull amphibious aircraft similar to the Goose, however, no further details were available.

Improving air transportation to Akutan has long been a goal of the community and Trident Seafoods. Trident's busiest season is winter and spring when up to 650 people are employed at the plant. Trident aims to move 50 to 70 people a day at the peak of the season. With the limited passenger capacity of the aircraft currently in use, eight or more flights a day are required to transport workers in and out of the community.

DOT&PF is conducting an airport master plan to explore the feasibility of a land-based airport to serve Akutan. Elements of the proposal included an environmental assessment, preliminary reconnaissance, airport layout plan, and airport master plan. DOT&PF has looked at air access issues and has identified several land-based sites, all in Akutan Harbor: on the south side of the harbor, toward Akun Straight; on the north side of the harbor, toward Akutan Point; and at the head of the harbor. Hot Springs Bay, northwest of Akutan Harbor, has also been mentioned as a potential site.

Information on these sites is not adequate at this time to determine their technical feasibility or whether the sites can be developed to meet minimum Federal Aviation Administration standards. Site access, wind coverage, and airspace penetrations, are a few of the issues that apply to several or all of the sites.

Because the ultimate feasibility of serving Akutan by air is uncertain, this regional transportation plan considered what would be required to provide a dedicated marine link between these communities. At present, the *Tustumena* provides eastbound ferry service running from Unalaska to Akutan and then on to Cold Bay and the remaining Alaska Peninsula communities en route to Kodiak. On the current schedule, the *Tustumena* calls at Akutan seven times per year. Improved *Tustumena* service for Southwest Alaska has been proposed as a separate alternative. In this proposal, the number of annual port calls out the Aleutian Chain would increase from 7 to 11, or 22 (and to call at Akutan both west- and eastbound). However, although this proposal represents a significant increase in the level of AMHS service to Akutan, it would not constitute a replacement for current air service. Therefore, the purpose of this discussion is to explore the possible replacement of Grumman Goose air service with a passenger-only ferry between Unalaska and Akutan.

The sea route between Unalaska and Akutan is characterized by exposed waters with strong winds and rough seas, and limited visibility (e.g., fog). The distance is such that a dayboat operation[15] would be feasible. The main route from Unalaska to Akutan passes north of Akutan Island. Although an alternate route, passing south of Akutan Island and through Akun Strait, comprises an equal sailing distance, this route would only be navigable at slack tide. As such, although this alternative route would not be suitable for regularly scheduled service departing at the same time every day, it could be used occasionally, when it is favored by the weather and tides are suitable.

A round-trip between Unalaska and Akutan is 96 nautical miles (n.m.). For a vessel with a nominal service speed of 11 knots, the required running time to accomplish the round trip would be about 9 hours (Table 73), which allows for slow running when entering and departing ports. Akutan is assigned a two-hour port time to allow for weather delays.

Thus the home-port to home-port running day is nominally eleven hours. Within the restrictions of the 12-hour service day applicable to dayboats, one-half hour is allowed for morning vessel startup and one-half hour is allowed for evening vessel shutdown. Morning loading of passengers in Unalaska and evening discharge of passengers at Unalaska could take place at the same time as vessel startup or shutdown activities.

[15] Meaning that the entire service day, including vessel startup and shutdown, can comfortably be accomplished in a twelve hour period. This makes it possible to crew the vessel with a single watch.

Table 73
Unalaska to Akutan Dedicated Ferry Service Schedule*

	2400 hour clock		Decimal Hours			
	Arrive	**Depart**	**Transit Duration**	**Port Time**	**Link Duration**	**Cumulative Duration**
Unalaska		0630 hrs			0.0 hrs	0.0 hrs
Akutan	1100 hrs	1200 hrs	4.50 hrs	2.0 hrs	6.50 hrs	6.50 hrs
Unalaska	1630 hrs		4.50 hrs		4.50 hrs	11.00 hrs

* A 44-week service year is assumed.

COSTS

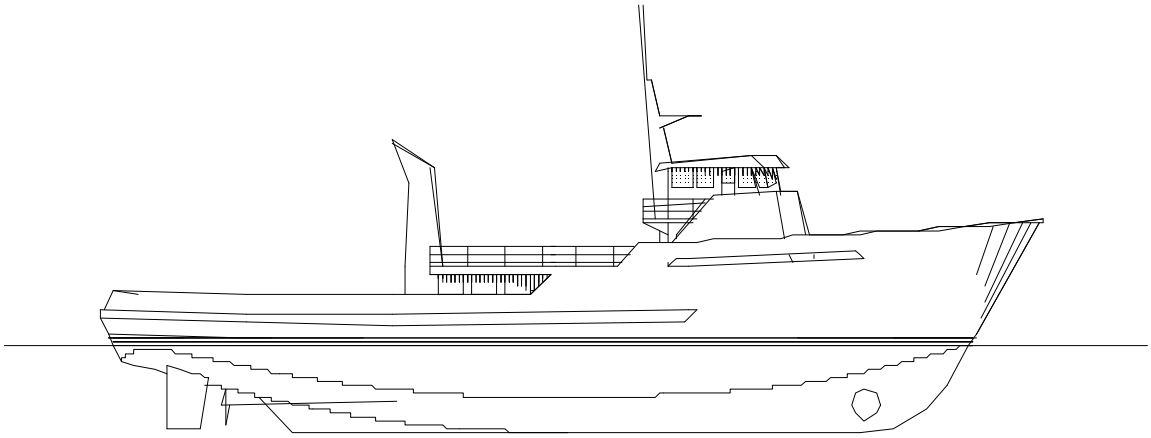
Construction costs for a new vessel of the type proposed are estimated in the range of $2.7 to $3.2 million, depending on classification and regulatory requirements, extent of outfitting, delivery voyage costs and acquisition scheme.

Operating costs are a function of both vessel type and proposed level of service. The model daily schedule upon which the operating costs have been estimated is contained in Table 73, which assumes a 44-week service year.

Vessel Considerations

Given the exposed waters on the route proposed between Unalaska and Akutan, seaworthiness would be the most important factor in selecting a vessel for this passenger-only service. It is judged that a vessel of about 150 feet length overall and with a nominal passenger capacity of 49 would be suitable for the capacity needs and environmental conditions of this service. The vessel should be twin screw for reliability and should be outfitted with a bow thruster. For seaworthy performance, it should have a forecastle providing adequate freeboard forward. The operating draft should be deep to enhance seakeeping performance. The ferry concept sketched in Figure 6 would be 150-feet overall with a 15-foot draft.

Figure 6
Concept Sketch for Unalaska to Akutan Marine Service



CREW

For the basis vessel, a single watch would comprise a crew of three to six in unrestricted service. Detailed in Table 74 are current (1998) compensation rates as negotiated between AMHS and the Inland Boatman's Union (IBU); Masters, Mates and Pilots Union (MMP); and the Marine Engineer's Benevolent Association (MEBA). Hourly base rates are for Alaska resident crew. In accordance with advice received from AMHS, benefits are shown as 38% of base pay rates. This benefits allowance includes the effect of paid leave. Daily rates assume 12 paid hours a day.

Table 74
Crew Compensation Rates by Position

Position	Hourly Base	Benefits	COLA	Total Hourly	Daily
Master	$18.08	$6.87	$3.62	$28.57	$342.84
Ch. Mate	$16.01	$6.08	$3.20	$25.29	$303.48
Ch. Engineer	$17.61	$6.69	$3.52	$27.82	$333.84
A.B. (QMED)*	$15.44	$5.87	$3.46	$24.77	$297.24
A.B.	$14.12	$6.57	$3.17	$23.86	$286.32
Cook	$13.82	$6.44	$3.13	$23.39	$280.68

* Estimated rates for A.B. (QMED)

As detailed in Table 75, the minimum crew would consist of a watchstanding master, an able-bodied seaman (A.B.) with a QMED ("Qualified Member of the Engine Department") license endorsement, and one additional A.B.

Table 75
Minimum Crew Costs
for Dedicated Unalaska–Akutan Service

Position	No.	Daily	308 Days (44 Weeks)
Master	1	$342.84	$105,595
A.B. (QMED)	1	$297.24	$91,550
A.B.	1	$286.32	$88,187
TOTAL	**3**	**$926.40**	**$285,332**

Maximum crew costs, as detailed in Table 76, presume that the master does not stand watch, that a licensed engineer is required, and that a cook is provided. Given the dayboat service schedule, the voyage legs' duration, and time spent in port, a cook may be optional, but is included in this estimate for fiscal prudence.

Table 76
Maximum Crew Costs in Unalaska-Akutan Service

Position	No.	Daily	308 Days (44 Weeks)
Master	1	$342.84	$105,595
Ch. Mate	1	$303.48	$93,472
Ch. Engineer	1	$333.84	$102,823
A.B.	2	$572.64	$176,373
Cook	1	$280.68	$86,449
TOTAL	**6**	**$1,349.28**	**$415,578**

Estimated annual operating costs for this marine link are itemized in Table 77.

Table 77
Operating and Cost Summary
for Unalaska–Akutan Ferry Service

Operating Cost Component	Minimum	Maximum
Hull Maintenance & Pass. Services Maint.	$44,000	$51,000
Machinery Maintenance	$64,000	$78.000
Crew	$285,332	$415,578
Fuel	$108,000	$132,000
Lubricating Oil	$2,500	$3,000
Ports and Terminals O.H.	$111,588	$111,588
Management O.H.	$183,370	$183,370
Shoreside O.H.	$35	$35
Insurance	$23,000	$26,000
TOTAL: (Annual Operating Cost)	$821,825	$922,649

Operating costs shown in this table are consistent with the operating cost analysis given in the "Juneau Access Marine Alternatives Study," March 1999, prepared for Alaska DOT&PF by The Glosten Associates, Inc. Overhead costs for: i) ports and terminals, ii) management, and iii) shoreside are based on fiscal year 1998 vessel operating costs provided by AMHS[16]. Overhead costs in Southwest Alaska were pro-rated according to vessel operating hours.

ESTIMATED DEMAND

To estimate demand for this marine link, which would essentially replace the existing air service, the aviation forecast for the year 2020 is used. This estimate is 2,327 passengers per year (*Southwest Alaska Transportation Plan Travel Demand Forecasts*, May 1998).

[16] Fiscal year 1998 vessel operating cost spreadsheet "Fy98_vsl.xls" prepared by B. Braley, dated 10/15/98.

AVIATION TERMINALS

Though many Southwest Alaska communities use air travel as their primary mode of transportation, few airports have public terminal facilities. In many cases, passengers arriving at these community airports must wait outside, exposed to potentially severe seasonal weather conditions. Passengers may also arrive at airports located miles from the community itself. Because of the extreme weather conditions associated with many Southwest Alaskan communities, a delay between interconnecting and return flights could be days. Moreover, it is likely that potential visitors and tourists are discouraged from traveling to these remote communities because of the safety and inconvenience associated with a lack of public terminal facilities.

Constructing public terminal facilities at airports would increase the quality of aviation service and provide a safe and protected environment for passengers to wait out of the natural elements. By providing an enclosed area for passengers to wait, a public terminal would substantially improve the quality of air service and at least match the level of transportation convenience expected at other regions of the state and rest of the country. Provision of terminals could help increase visitors and tourists to the region, thereby increasing aviation demand that could lower prices and increase service.

EXISTING CONDITIONS

Characterized by small population centers separated by long distances and rugged terrain, Southwest Alaska has no land links to the rest of the state or the continental United States. For Southwest Alaska, air travel is the most common way for people to travel within and from the region. Though almost every community in Southwest Alaska has access to some type of community airport, public terminal facilities at Community airports are generally not available.

Of the 49 public airports in Southwest Alaska, only two, Adak and Unalaska, have consolidated public terminals with full passenger facilities and services. Additionally, only another nine airports have private terminals. Consequently, private terminal services offer a widely varied level of passenger facilities and services. Some private terminals consist of only an aircraft hangar, while others have passenger-waiting areas with telephone and restroom services. Four more airports provide unheated covered shelters from which passengers can escape inclement weather. Only two of these four have phones. The remaining 34 public airports have no passenger facilities or services whatsoever. Passengers arriving to or departing from these airports have no means to escape the weather and no way of contacting the community or air carrier. Additionally, 13 of these 34 airports are located more than a mile from the community center. Most of the 13 are between three or four miles with some being nearly five or six miles from the community. Inventoried in Table 78 are the passenger facilities and services available at each public airport in Southwest Alaska. Shaded rows indicate that no passenger facilities or services whatsoever are available at these airports.

Table 79
Passenger Facilities and Services Inventory of Southwest Alaska Airports

Airport	Combined Terminal	Private Terminals	Heated Building	Covered Shelter	Bathrooms with Running Water	Outhouses	Phone	Restaurant	Snack Bar/Coffee	Snack Machine	Bar	Gift Shop	No Facilities or Services	Proximity To Community
Adak	✓		✓	✓	✓		✓	✓	✓	✓				4 miles
Akhiok													✓	3 miles
Akutan													✓	<1 mile
Aleknagik													✓	<1 mile
Atka													✓	2 miles
Chignik													✓	<1 mile
Chignik Lagoon													✓	<1 mile
Chignik Lake													✓	<1 mile
Clarks Point				✓			✓							<1 mile
Cold Bay		✓	✓	✓	✓		✓	✓		✓	✓			<1 mile
Dillingham		✓	✓	✓	✓		✓	✓		✓		✓		2 miles
Egegik													✓	<1 mile
Ekuk				✓										<1 mile
Ekwok				✓										1 mile
False Pass													✓	<1 mile
Igiugig													✓	<1 mile
Iliamna		✓	✓	✓	✓		✓							1.5 miles
Ivanof Bay													✓	5 miles
Karluk													✓	1 mile
King Cove				✓			✓							2 miles
King Salmon		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		<1 mile

Table 79
Passenger Facilities and Services Inventory of Southwest Alaska Airports

Airport	Combined Terminal	Private Terminals	Heated Building	Covered Shelter	Bathrooms with Running Water	Outhouses	Phone	Restaurant	Snack Bar/Coffee	Snack Machine	Bar	Gift Shop	No Facilities or Services	Proximity To Community
Kodiak		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		5 miles
Kokhanok													✓	1 mile
Koliganek				✓										1 mile
Larsen Bay													✓	3 miles
Levelock													✓	2.5 miles
Manokotak													✓	<1 mile
Naknek		✓	✓	✓	✓		✓							<1 mile
Nelson Lagoon							✓							<1 mile
New Stuyahok				✓										1 mile
Nikolski													✓	2.5 miles
Nondalton							✓							<1 mile
Old Harbor													✓	2 miles
Ouzinkie				✓										<1 mile
Pedro Bay													✓	1 mile
Perryville													✓	5 miles
Pilot Point													✓	5 miles
Port Alsworth		✓	✓	✓	✓		✓	✓	✓					<1 mile
Port Heiden		✓	✓	✓	✓		✓							6 miles
Port Lions													✓	2 miles
Portage Creek													✓	<1 mile
Saint George		✓	✓	✓			✓							4 miles

Table 79
Passenger Facilities and Services Inventory of Southwest Alaska Airports

Airport	Combined Terminal	Private Terminals	Heated Building	Covered Shelter	Bathrooms with Running Water	Outhouses	Phone	Restaurant	Snack Bar/Coffee	Snack Machine	Bar	Gift Shop	No Facilities or Services	Proximity To Community
Saint Paul		✓	✓	✓	✓		✓							3 miles
Sand Point		✓	✓	✓	✓		✓							<1 mile
South Naknek													✓	1 mile
Togiak													✓	<1 mile
Twin Hills													✓	<1 mile
Ugashik													✓	1 mile
Unalaska	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓		<1 mile

Compiled by HDR Alaska, Inc.

DOT&PF had a program for developing terminals during the early 1980s that by most accounts is considered a failure. Any future program must learn from the mistakes made under that program to be successful. The main reasons identified for the failure of that program are that the terminals were developed, owned, and maintained entirely by DOT&PF. They were not staffed. They had no heat, electricity, lights, or other amenities. As such, there was little local "ownership" in respecting their usefulness and longevity. Often located a distance from the community, with no local oversight or "ownership," they became the targets for vandalism and fell into disrepair.

To have any chance of long-term success, any proposed airport terminal development project must learn from these lessons. The program proposed as an alternative for consideration in this plan would set up a program whereby DOT&PF participated in funding capital for terminal improvements at certain airports – but where the ownership, operation, and maintenance of the terminal would be local.

The details of the program would still need to be worked out, certain conditions and considerations would need to be part of any future program.

First, the proposed program would not be a DOT&PF instigated program. DOT&PF does not propose going to every community to build a terminal. Any terminal development project would require that a local, qualified entity come forward as a project sponsor. To qualify as a sponsor, several assurances (at a minimum) would have to be made to the DOT&PF, namely:

- The sponsor would have to agree to all operations and maintenance responsibilities for a time period that would cover the DOT&PF's grant assurances to the FAA.
- Some assurance would have to be incorporated into the program or agreement with DOT&PF that would assure that this long-term commitment to M&O would be fulfilled.
- The terminal would have to be open to the public.

Several other issues would have to be resolved if such a program were to be carried forward, including the following: :

- Who would qualify as a project sponsor? Borough or community governments? Airlines? Fixed-base operators? Native corporations? Non-profits? Tribal governments?
- Would the sponsor be allowed to run the terminal as a non-profit operation or as a for-profit operation by selling food or snacks, counter space, or rooming facilities? (The FAA does not typically fund revenue-generating areas within terminals.)
- Would the sponsor be required to provide some minimum level of service? In other words, is a building that is more than an open shelter (i.e., if it has heat, a phone, a bathroom etc.) more likely to be respected and cared for?
- Should some minimum level of staffing or hours of operation be required to protect the investment from vandalism or to ensure its usefulness to the traveling public?
- What administrative effects would such a program have for DOT&PF?
- Would the program be limited to certain class airports? Communities of a certain size? Communities with a certain number of enplanements? Communities with no other services at the airport?

PROGRAM IMPLEMENTATION

A terminal development program as just described could be implemented in several ways. One approach would be for the DOT&PF to set aside an amount of money as a program line item. Communities could then apply or nominate terminal projects against this pot of funding, which would provide a mechanism for funding terminal development where terminals would only compete with other terminals, much like the TRAAK program functions. Another mechanism for implementing the program would be to encourage terminal projects to compete with all other projects in the normal Airport Improvement Program process. Historically, however, terminal development has not scored well when competing against safety projects and airside improvements. If the terminal development program idea were carried forward in the plan and the Department were serious in encouraging terminal development, it may be necessary to revisit the AIP scoring criteria to help rural terminals to score better against other projects.

COSTS

The cost of a terminal would be highly dependent on what local sponsors' proposals. To get an idea of a range of the cost of such a program for Southwest Alaska, a basic public terminal was assumed. The conceptual idea for the terminal is that it would provide an enclosed and heated waiting facility with chairs. For cost estimating purposes, the public terminals are assumed to provide limited convenience facilities such as restrooms, lights, phone, and/or a coffee/snack shop. Costs for the basic terminal have been estimated at a planning level. A $200.00 per square foot cost was used for a basic 20' x 40' public terminal; at which the cost would be approximately $160,000. Note that these costs are planning-level estimates only – shipping or additional features would result in cost variations.

The following table suggests the potential number of terminal facilities in Southwest Alaska (assuming the program is targeted at community class airports that have either no existing facilities or only a covered shelter). Shown are total costs if every airport applied and received a basic public terminal described above. If the program were implemented, it is likely that not all communities would want or be able to secure a qualifying sponsor. Based on this assumption, actual costs would be less than the estimate provided.

Table 79
Public Aviation Terminal Cost Estimate

	Basic Public Terminal ($160,000 per terminal)
Cost for 36 Terminals	5,760,000
20% DOT&PF Overhead &Administration	1,152,000
10% Contingency	576,000
Total	$7,648,000.00

CONSTRUCTION AND MAINTANENCE

Annual maintenance and operations (M&O) costs are estimated in Table 80. Labor cost estimates for overseeing the terminals are based on one person working an 8-hour day at $12 per hour, with the terminal open 365 days a year. It should be noted that the M&O costs would be the responsibility of the sponsor/operator under the proposed program.

Table 80
Airport Terminal M&O Cost Estimate

	M&O	Labor	*Total Annual Costs
Basic Public Terminal	$5,000	$35,000	$40,000

*Total Annual Costs have been estimated at the planning level only. Actual costs would vary by community.

EXPLORATION OF DEVELOPMENT OF AN AVIATION HUB IN SOUTHWEST ALASKA

A commonly noted transportation issue in Southwest Alaska is the lack of an effective aviation hub in the region, necessitating long and expensive trips to Anchorage to travel even within the region. Undertaken as part of this transportation planning effort was exploration of what would be required to induce air carriers to shift their operations to support development of an aviation hub within Southwest Alaska, in a location such as King Salmon, Kodiak, Cold Bay, or Dillingham. Although this exploration ultimately revealed that developing such a hub would require expensive subsidies (the cost of which would almost certainly be prohibitive), the findings of this study are nonetheless helpful in understanding the region's economic and transportation challenges.

What is an Aviation Hub?

To answer the initial question, "What is an Aviation Hub?" Northern Economics interviewed representatives of airlines operating in Southwest Alaska,[17] who reported that from their perspective, an aviation hub has the following attributes:

- a centrally located airport from which routes emanate in a spoke-like manner
- enough demand and route possibilities to allow for efficient aircraft utilization
- airport and airways accessible in almost all weather conditions
- aircraft fueling facilities
- aircraft storage facilities
- aircraft maintenance facilities
- terminal facilities that allow airlines to co-exist in a single location
- complete ticketing facilities

WHICH SOUTHWEST ALASKA AIRPORTS ARE CANDIDATES FOR HUB STATUS?

Based on these criteria, the consultant developed a list of hub candidates in the Southwest Alaska Study Area, and assessed their positive and negative characteristics for this role (Table 81). Enplanements at each hub candidate are enumerated in Table 82 and the candidates' runway dimensions are listed in Table 83. Based on the combination of these attributes, King Salmon would appear to be the most logical choice for an aviation hub, if one were to be developed in the study area.

[17] Representatives of Alaska Airlines, Yute Air Alaska, Peninsula Airways, Reeve Aleutian Airways, ERA Aviation, and Iliamna Air Taxi were all interviewed.

Table 81
Pros and Cons of Aviation Hub Candidates in Southwest Alaska Study Area

Community	**Positive Characteristics**	**Negative Characteristics**
Cold Bay	• Large airstrip with cross landing strip • Access to Aleutian Chain	• Lack of facilities • Lowest passenger and cargo traffic
Kodiak	• Highest number of small airplane and cargo enplanements in SW-AK for the past ten years • Existence of infrastructure • Comparatively high demand for tourism	• Not centrally located to many SW Alaska communities
Unalaska	• Better connections to the Aleutian chain and mainland Alaska	• Adverse weather conditions • Short runway • Technological problems (e.g. weather station is only staffed 12 hours/day) • Not centrally located to many SW Alaska communities
Dillingham	• Active airport with multiple airlines currently providing service • Relatively diversified local economy (hotels, restaurants, medical) • More summer traffic than King Salmon	• Adverse weather inhibits scheduled air service • Little land available at airport for development • No central terminal – there are 13 separate buildings from which airlines operate
King Salmon	• The region's most technologically advanced airport • Sewer and other infrastructure remain from the now closed Air Force base • Tourism activity already high. • Available land for development • Better weather conditions and landing success than at Dillingham • Centrally located to more SW Alaska Communities	• Possibly too far East to fully serve Peninsula communities • Lack of key service facilities such as lodging, restaurants, and medical facilities.

Table 82
1997 Passenger Enplanements
Southwest Alaska Aviation Hub Candidates

Hub Candidate	Percentage of Southwest Alaska Enplanements	
	Commuter and Small Certified Carriers Air (CAC)	Large Certified Air Carriers (CRAC)
Unalaska	5.2	11.9
Cold Bay	2.3	7.4
Kodiak	27.6	30.2
King Salmon	19.3	15.3
Dillingham	17.0	10.6

Sources: (1) Parsons Brinckerhoff, et al. 1997. Southwest Alaska Transportation Plan, Existing Conditions Technical Memorandum, Draft, pp. 106-107. (2) Department of Transportation, Aviation Department, Carl Siebe, Anchorage, Alaska.

Table 83
Hub Candidates' Runway Dimensions

Hub Candidate	**Airstrip size (in feet)**	
	Length	**Width**
Unalaska	3,900'	100'
Cold Bay	10,420'	150'
Kodiak	7,562'	150'
King Salmon	8,500'	100'
Dillingham	6,404'	150'

Sources: (1) Parsons Brinckerhoff, et al. 1997. Southwest Alaska Transportation Plan, Existing Conditions Technical Memorandum, Draft, pp. 106-107. (2) Department of Transportation, Aviation Department, Carl Siebe, Anchorage, Alaska.

AIR CARRIERS' PERSPECTIVES ON THE FEASIBILITY OF A SOUTHWEST ALASKAN AVIATION HUB

Based on conversations with airline representatives regarding the feasibility of reconfiguring airline operations to support an aviation hub in Southwest Alaska, Northern Economics reported the following:

- Airlines follow demand. Without demand for their services, there is no revenue. The willingness for airlines to promote the development of a hub in SW Alaska will increase primarily by increasing the demand for air traffic.
- There is unanimous agreement among Southwest Alaska-serving airlines that aircraft overcapacity exists.

- Airlines believe that if a hub in SW Alaska was economically feasible, then it would have already developed.
- In addition to demand, costs are critical decision points.
- Labor is the key cost component that airlines can control. In the U.S., labor costs, on average account for fully a third of airlines' operating costs. Labor costs are significantly higher (approximately 35% higher) in Southwest Alaska than in Anchorage.
- Aircraft expenditures including debt service, lease payments, parts and equipment account for 20-40% of the airline's total costs.
- Property (including leasing expenditures) account for 15-30% of an airline's total costs.
- Insurance, on average, is likely to account for 10% of an airline's costs.
- Fuel costs generally represent 5% of an airline's total costs. The cost of fuel in King Salmon is between 200% and 300% the cost of fuel in Anchorage.

Strategies for Supporting a Southwest Alaska Aviation Hub

Based on their understanding of the cost considerations that determine airlines' operating strategies, Northern Economics ran some calculations to determine what strategies could be pursued to induce the airlines to support an aviation hub in Southwest Alaska, and at what cost. The inducements fall into the categories of direct encouragement, which would include labor and fuel cost subsidies; and indirect encouragement, which would consist of actions such as capital improvements to existing airports, as well as improvements to other transportation modes (e.g., building additional road links), which would indirectly stimulate air travel demand. Each of these possibilities is discussed below.

DIRECT ENCOURAGEMENT

Strategy: Subsidize labor costs (35% of airlines' budgets in Southwest Alaska)

Baggage handlers earn approximately $7.50 per hour in Anchorage, and $10.00 in King Salmon. Labor costs in general, are 35% higher in King Salmon than in Anchorage. Assume an airline with yearly total revenue of $15.0 million spends $5.0 million on labor. If the airline moves its operations to the new hub, labor would cost $6.7 million. If all other costs stayed the same, the airline would report a net loss of $1.1 million, and need a labor subsidy of 1.8 million to attain the same profit.

Assume the same airline decides to move 50 percent of its labor force to King Salmon. Total labor costs would equal $5.9 million, the airline would lose of $200,000, and would therefore need a labor subsidy of $0.9 million to attain the same profit.

Table 84
Hypothetical Balance Sheet Comparing Labor Costs between a Hub in Anchorage and a Hub in Southwest Alaska ($ millions)

	Anchorage Hub	Southwest Alaska Hub	
		Labor Cost Increase 35%	Labor Cost Increase 17.5%
Labor	5.0	6.8	5.9
AIRCRAFT	4.3	4.3	4.3
PROPERTY	2.9	2.9	2.9
INSURANCE	1.4	1.4	1.4
FUEL	0.7	0.7	0.7
Total Costs (TC)	**14.3**	**16.1**	**15.2**
Total Revenue (TR)	15.0	15.0	15.0
Profit (TR-TC)	**0.7**	**-1.1**	**-0.2**
Labor Subsidy	**0.0**	**1.8**	**0.9**

Strategy: Subsidize fuel costs (5% of airlines' budgets)

Jet Fuel costs $0.60 per gallon in Anchorage, but over twice as much, $1.65 per gallon, in King Salmon. **Scenario A**. Assume an airline with yearly total revenue of $15.0 million. For such an airline, $0.7 million is spent on jet fuel at 60 cents per gallon in Anchorage. The same amount of fuel purchased at King Salmon would cost $2.0 million. If all other costs stayed the same, the airline would report a net loss of $0.6 million and would need a subsidy of $1.3 million to attain the same level of profit as it achieved at the Anchorage hub. **Scenario B**. Assume the same airline bought 50% of its aircraft fuel at the new hub in King Salmon. Total fuel costs would equal $1.3 million. The airline would report a net profit of $100,000, but would need a subsidy $0.6 million subsidy to attain the same level of profit.

Table 85
Hypothetical Balance Sheet Comparing Labor Costs between a Hub in Anchorage and a Hub in Southwest Alaska ($ millions)

	Anchorage Hub	Southwest Alaska Hub	
		Fuel Cost Increase 250%	Fuel Cost Increase 175%
Labor	5.0	5.0	5.0
Aircraft	4.3	4.3	4.3
Property	2.9	2.9	2.9
Insurance	1.4	1.4	1.4
Fuel	0.7	2.0	1.3
Total Costs (TC)	**14.3**	**15.6**	**14.9**
Total Revenue (TR)	15.0	15.0	15.0
Profit (TR-TC)	**0.7**	**-0.6**	**0.1**
Fuel Subsidy	**0.0**	**1.3**	**0.6**

INDIRECT ENCOURAGEMENT: AIRPORT AND AIRWAY IMPROVEMENTS

Strategy: Make capital improvements at Southwest Alaska airports

Runways. Airlines indicated that DOT&PF would do well to continue to upgrade existing runways. Improving the runways reduces airline operating costs, thereby making it more profitable to travel at lower load levels. The following improvements were noted as desirable:

- Paved runways
- Cross-wind runways
- Runway lights

Navigational Improvements. The airlines have ideas on how to implement technology to provide better customer service (i.e. lights, navigation systems, increased airway safety) and reduce airline operating costs. The technologies they advocate include the following:

- Automated Weather Observations Systems (AWOS)
- Differential Global Positioning Systems (DGPS)
- Wide Angle Augmentation System (WAAS)

Terminal Development. A multiple-airline terminal was cited by some airlines as an essential component of hub development. Multiple airline terminals reduce operating costs and improve customer service. However, some airlines noted that they have already made significant investments in buildings at most airports in Southwest Alaska, and might oppose terminal development unless compensated for property investments.

Strategy: Stimulate air travel demand

Another means of improving conditions for development of an aviation hub in Southwest Alaska would be to stimulate demand for air travel by making non-aviation related transportation infrastructure improvements, such as the following:

- Roads linking adjacent communities
- Roads to aid land-based cargo movements
- Deepwater port development to reduce costs of doing business
- Roads to deepwater ports

Conclusions

- If the demand exists, air service will be provided. Current demand and costs preclude hub development in SW Alaska (unless substantial subsidies were provided).
- Operations costs in SW Alaska are much higher than in Anchorage.
- King Salmon appears to have more positive hub attributes than any other in SW Alaska.
- DOT could reduce costs to airlines by improving airports and airways.
- DOT could stimulate demand for air travel in Southwest Alaska, which would support eventual hub development, by providing additional non-aviation transportation infrastructure.
- Tourism would appear to be a primary beneficiary of development of an aviation hub in Southwest Alaska. Tourists appear to desire a preset travel itinerary and do not enjoy spending time waiting at airports without services or having to travel back and forth through Anchorage in order to tour Alaska's Southwest. Making airport and airway improvements at non-hub airports would improve the region's ability to attract tourism.
- The area's residents living in rural communities show limited interest in direct connections between their home and surrounding communities. Residents appear to prefer travel to Anchorage for shopping, health services, and entertainment. However, if these types of services were offered in SW hub communities at prices similar to those in Anchorage, then resident travel demand within Southwest Alaska may increase.

Additional Research and Planning Needs Identified

- Analysis of demand for travel within SW Alaska by residents
- Stakeholder meetings, in particular between DOT and airline officials
- More precise specification of alternatives
- Feasibility and Cost/Benefit Analyses

Table 86
Southwest Alaska Transportation Plan Alternatives Summary Sheet

Package	Elements	Capital Recovery Factor[3]	Annual M&O Cost	Issues
1. Baseline Alternative	All regional transportation projects programmed for the Southwest Alaska Study Area, as reflected in STIP, Aviation Improvement Program, and Legislative Funding for FY 1999 for Ports and Harbors. Includes Winter Trail Marking Project.			♦ The baseline projects with the greatest regional impacts include planned completion of the Dillingham-Aleknagik roadway, completion of the Iliamna-Nondalton Road, the Winter Trail Marking project, and major port improvements at Kodiak.
2. Cook Inlet to Bristol Bay Corridor Alternative	CORE ELEMENTS 1. Homer-Seldovia- Williamsport Marine Service[1] 2. Williamsport to Pile Bay Roadway Link[2] **SUBTOTAL**	 $460,694 **$1,402,443** **$1,862,137**	 $1,846,606 $209,250 **$2,055,850**	♦ Development of a surface transportation corridor from Homer to Bristol Bay would allow provide better access to communities such as Iliamna, Nondalton, Pile Bay, and Igiugig; would decrease freight shipping costs for goods that are now flown in or barged around the Alaska Peninsula; and would open up the potential for tourism throughout the proposed corridor. ♦ Significant navigational improvements would be required at Williamsport, unless an alternate ferry port were selected.
	OVERLAND OPTION A. VIA KING SALMON CORE ELEMENTS 1-2, PLUS • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway Link • Igiugig to King Salmon Roadway Link **TOTAL**	**$1,862,137** $4,896,161 $7,451,378 $7,215,395 **$21,425,071**	**$2,055,850** $513,000 $756,000 $756,000 **$4,080,850**	♦ Although all options of this alternative rely on a ferry link from Homer to Williamsport and improvement of the Williamsport-Pile Bay road, two of the options rely wholly on overland routing, while the other two rely on a combination of overland and marine routing. ♦ The first wholly overland option is routed through King Salmon. This option has somewhat lower capital and M&O costs.
	OVERLAND OPTION B. VIA NAKNEK Core Elements 1-2, Plus • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway Link • Igiugig to Naknek Roadway Link • Igiugig to Levelock Roadway Link **TOTAL**	**$1,862,137** $4,304,000 $7,451,378 $9,663,000 $2,590,000 **$25,870,515**	$**2,055,850** $570,000 $756,000 $1,012,50 $256,500 **$4,650,856**	♦ The second wholly overland option is routed through Naknek, which has the advantage of allowing a tie-in from Levelock. Compared to the option routing through King Salmon, this option has somewhat higher capital and M&O costs.
	MARINE OPTION A. VIA HOVERCRAFT Core Elements 1-2, Plus • Lake Iliamna-Kvichak River Service via Hovercraft **TOTAL**	**$1,862,137** $519,000 **$2,381,137**	$2,055,856 $1,729,000 **$3,784,856**	♦ Two options combining roadway and marine links were explored. The first involves use of a hovercraft to serve the communities in the area of Lake Iliamna and the Kvichak River west to Bristol Bay. The hovercraft's major advantage is the fact that it would be operable basically year-round, with about 20 days set aside for maintenance. Potential issues with the hovercraft option include noise impacts.
	MARINE OPTION B. VIA SHALLOW-DRAFT LANDING CRAFT Elements 1-2, plus Lake Iliamna-Kvichak River Service via Shallow-Draft Landing Vessel **TOTAL**	 $1,862,137 $73,249 **$1,935,386**	 $2,055,850 $324,550 **$2,380,400**	♦ The second option explored to provide a marine link from Pile Bay west to Bristol Bay was use of a high-speed, shallow-draft landing vessel. ♦ Given the distances involved, dayboat service (each day's trips not exceeding 12 hours) would be feasible. Substantial crewing savings accrue under the dayboat concept. (However, this is not "dayboat" service in the sense that vessel and crew would not return to the same home port every night. Some passengers would have to find lodging on shore as the vessel would have overnight space for crew only). A high-speed vessel (25-knot) is desirable for this option in order to be able to navigate against the river current. This option's chief disadvantage is that winter ice would constrain operations to the period between May 1- October 31.

[1]The Homer-Seldovia-Williamsport Marine Service concept cost estimate includes capital and M&O costs associated with dredging at Williamsport. The total capital cost used, based on an Army Corps of Engineers estimate, is $2,130,6000, which reflects the non-federal share only. [2]For each roadway link, capital and M&O costs were estimated for both paved and unpaved options. This table reports the figures for the paved option only. [3]An annual capital recovery factor was calculated for each project based upon the total capital cost and the assumed 20-year design life of each project. Using a 7% discount rate, the capital recovery factor is the annual payment over 20 years that is equivalent in present value to the total capital cost for each project. Calculation of this factor facilitates the useful comparison of capital costs to O&M costs on an annual basis, and also would allow for comparison of projects with differing years of design life.

Package	Elements	Capital Recovery Factor[3]	Annual M&O Cost	Issues
3. Dedicated *Tustumena* Alternative	OPTION A. 22 TRIPS OUT ALEUTIAN CHAIN PER YEAR • REDEPLOYMENT OF *TUSTUMENA* SUCH THAT VESSEL SERVICE IS DEDICATED TO SOUTHWEST ALASKA STUDY AREA **TOTAL**	NA	$7,178,848 **$7,178,848**	♦ Dedicating the *Tustumena* to Southwest Alaska differs from the other alternatives insofar as it simply involves reallocation of existing service as opposed to the development of new facilities or service. ♦ Currently, the communities on the south side of the Alaska Peninsula, from Chignik southwest to Unalaska, receive 7 round trips of AMHS service per year (7 trips each east- and westbound). Option A of this alternative would increase the number of trips out the Aleutian chain to 22 round trips per year within a 44-week service period (typical of both AMHS mainline vessels and historic *Tustumena* deployment). The number of trips between the Kenai Peninsula and Kodiak under this option would increase from the 1997 level of 72 to 132. ♦ For Option A, M&O costs are estimated at $7,718,848. Based on the planning-level demand estimated prepared for this analysis, total revenues (passenger and vehicle tariffs, stateroom tariffs, and food sales) are estimated to generate on the order of $4,637,000 under Option A. This would leave a net subsidy required on the order of $3,082,000. This is not far from the current ratio of M&O costs relative to revenues for this vessel. While current M&O costs for the *Tustumena* are in the neighborhood of $7,709,000, current revenues are in the neighborhood of $ 3,276,000, leaving a current subsidy of $4,433,000.
4. Dedicated *Tustumena* Alternative	OPTION B. 11 TRIPS OUT ALEUTIAN CHAIN PER YEAR • Redeployment of *Tustumena* such that vessel service is dedicated to Southwest Alaska Study Area[3] **TOTAL**	NA	$7,717,010 **$7,717,010**	♦ Option B of this alternative would also increase the number of trips out the Aleutian chain, but only half as much as Option A,—from 7 to 11 trips within a 44-week service year. ♦ The number of port calls from Homer to Kodiak would increase from 72 to 176. At $7,717,000, estimated M&O costs for Option B are close to those for Option A. Total revenues (passenger and vehicle fares, stateroom sales, and food sales) are estimated to generate a total of $4,620,000, leaving a net subsidy of $3,097,000 required.
5. Alaska Peninsula Roadway System (Northern Portion) Alternative	• South Naknek to Naknek Roadway Link • King Salmon to Egegik Roadway Link • Egegik to Pilot Point Roadway Link • Pilot Point to Ugashik Roadway Link • Pilot Point to Port Heiden Roadway Link **TOTAL**	$755,427 $9,224,549 $7,060,780 $2,275,530 $11,312,709 **$30,628,995**	$29,700 $877,500 $739,800 $159,300 $1,185,300 **$2,991,600**	♦ Among the transportation infrastructure improvements recently advocated as a means of improving Bristol Bay and Lake and Pen Boroughs' economic development are roadway links in this alternative. Capital and M&O costs for these links, relative to the population served, are extremely high. The region's rough terrain and weather, as well as environmental sensitivity, would make permitting complex and construction costly. Wetlands and wildlife impacts would be significant. An element of this alternative with particular benefits would be completion of the South Naknek to Naknek link, which would bridge the Naknek River to connect these communities. This connection would allow residents of South Naknek to access the many goods and services (including school) available in Naknek and in King Salmon, which is already connected by road to Naknek.
6. Alaska Peninsula Roadway System (Southern Portion)	• Port Heiden to Chigniks Roadway Link • Chignik Lake to Chignik Bay to Chignik Lagoon Roadway Link • Metrofania Airport • Chigniks to Perryville Roadway Link • Perryville to Ivanof Bay Roadway Link **TOTAL**	$7,988,473 $2,911,927 $1,132,715 $5,301,720 $1,288,463 **$18,623,298**	$837,000 $305,100 $30,000 $541,350 $135,000 **$1,848,450**	♦ Like the Northern Portion of the Alaska Peninsula Roadway Alternative, links in this alternative have been suggested as a means of supporting the economic recovery and development of Bristol Bay area. And again, capital and M&O costs relative to the population served are extremely high. The elements of this alternative with the greatest potential benefits are (1) the roadway system that would connect and integrate the Chigniks; and (2) development of a new, regional airport at Metrofania Creek, which would provide these communities with a better aviation facility while raising the possibility of eliminating redundant aviation M&O costs.
7. Bristol Bay Marine Service	• Marine system serving Togiak, Dillingham, Clarks Point, Naknek, and Egegik **TOTAL**	$330,375 **$330,375**	$890,000 **$890,000**	♦ While this alternative would provide a benefit in terms of linking outlying communities with the regional hub of Dillingham, it has several drawbacks: (1) service along this route could only be provided between May and October due to winter ice; (2) shallow water at Dillingham and several other ports would results in frequent schedule delays of up to six hours to accommodate tides; (3) long distances between ports would require long running times, with two legs requiring close to 11 hours apiece.
8. Intra Kodiak Island Marine Service	• New marine service to the outports of Kodiak Island **TOTAL**	$307,000 **$307,000**	$2,151,000 **$2,151,000**	♦ Given the state's difficulty in meeting its current M&O burden, it is extremely unlikely that this alternative would be feasible as a state-owned and operated service. Rather, it is presented and explored as a service for which local government be responsible. Service is complicated by inadequate port facilities at several of the communities served. While the proposed route's exposed waters and rough seas indicate the need for a relatively large, deep-draft vessel, the ports' narrow, rocky, and shallow-water approaches mean that passengers would have to be lightered to and from the primary vessel, which renders this service (1) more costly than traditional service since lighterage requires additional crew; (2) slower and less efficient than traditional service; (3) less reliable than traditional service insofar as lighterage would have to be suspended in adverse weather conditions; and (4) much less efficient for cargo carrying purposes, given the need to lighter cargo manually.